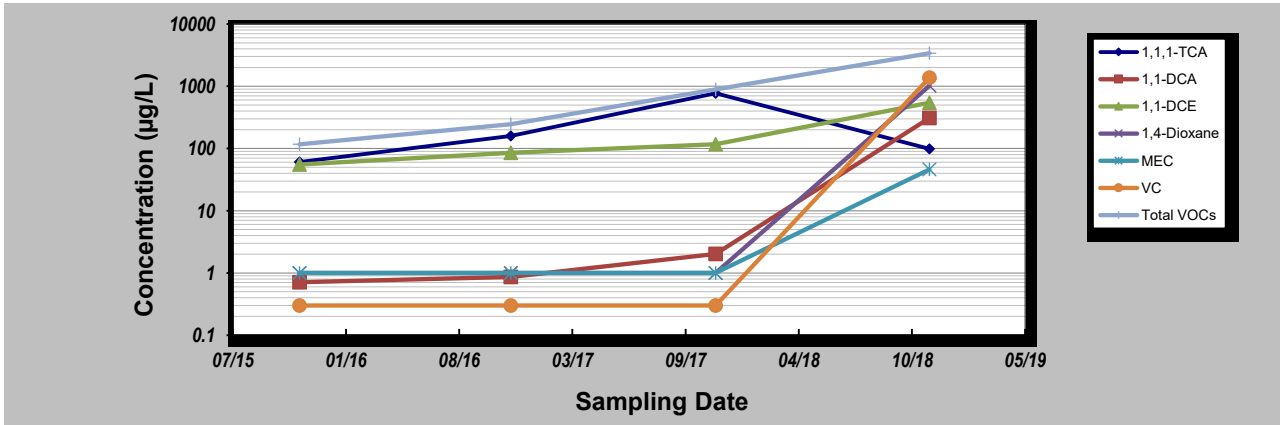


GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW2**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW2 CONCENTRATION (µg/L)						
1	10-Nov-15	60.7	0.71	55.3	1	1	0.3	116.71
2	17-Nov-16	159	0.86	85.4	1	1	0.3	245.26
3	14-Nov-17	772	2.02	117	1	1	0.3	891.83
4	27-Nov-18	99.1	309	544	1020	46.1	1370	3399.62
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Coefficient of Variation:		1.23	1.97	1.15	1.99	1.84	2.00	1.31
Mann-Kendall Statistic (S):		2	6	6	3	3	3	6
Confidence Factor:		62.5%	95.8%	95.8%	72.9%	72.9%	72.9%	95.8%
Concentration Trend:		No Trend	Increasing	Increasing	No Trend	No Trend	No Trend	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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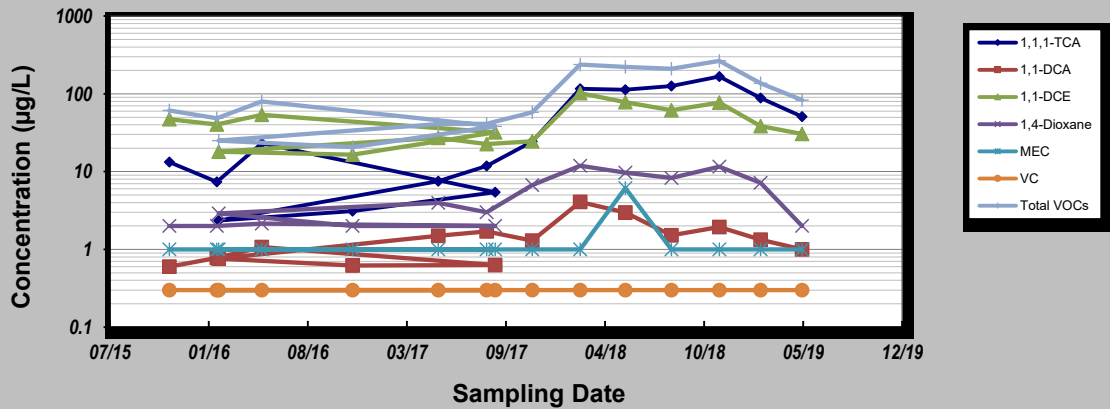
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW3**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW3 CONCENTRATION (µg/L)						
1	12-Nov-15	13.3	0.6	47.1	2	1	0.3	61
2	16-Feb-16	7.38	0.78	40.4	2	1	0.3	48.56
3	17-May-16	23.1	1.07	53.7	2.15	1	0.3	80.02
4	31-Aug-17	5.44	0.63	32	2	1	0.3	38.07
5	16-Nov-16	3.1	0.62	16.5	2	1	0.3	20.64
6	20-Feb-16	2.35	0.76	18	2.9	1	0.3	24.99
7	8-May-17	7.54	1.5	27.2	3.98	1	0.3	40.82
8	14-Aug-17	11.8	1.7	22.6	3.01	1	0.3	41.14
9	14-Nov-17	24.4	1.3	24.6	6.7	1	0.3	57.84
10	19-Feb-18	116	4.07	102	11.9	1	0.3	236.85
11	21-May-18	113	2.99	78.3	9.69	6.13	0.3	221.81
12	22-Aug-18	126	1.52	61.6	8.27	1	0.3	210.35
13	27-Nov-18	167	1.94	77.1	11.6	1	0.3	265.12
14	18-Feb-19	88.4	1.33	38.4	7.17	1	0.3	137.08
15	13-May-19	50.8	1	30.6	2	1	0.3	82.92
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Coefficient of Variation:		1.10	0.66	0.57	0.72	0.99	0.00	0.82
Mann-Kendall Statistic (S):		51	45	11	53	6	0	41
Confidence Factor:		99.4%	98.6%	68.7%	99.6%	59.6%	48.0%	97.7%
Concentration Trend:		Increasing	Increasing	No Trend	Increasing	No Trend	Stable	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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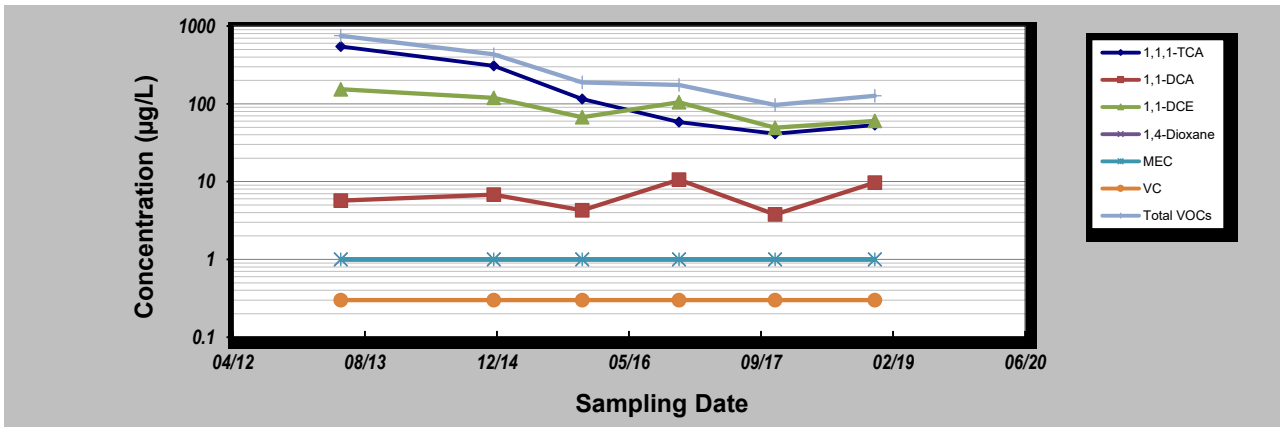
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW4**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW4 CONCENTRATION (µg/L)						
1	15-May-13	546	5.7	154	1	1	0.3	749.8
2	15-Dec-14	307	6.8	119	1	1	0.3	434.3
3	15-Nov-15	115	4.28	67.3	1	1	0.3	188.43
4	15-Nov-16	58.2	10.6	105	1	1	0.3	174.84
5	14-Nov-17	41.3	3.78	49.3	1	1	0.3	96.66
6	27-Nov-18	53.2	9.67	60.5	1	1	0.3	127.12
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Coefficient of Variation:		1.08	0.41	0.44	0.00	0.00	0.00	0.86
Mann-Kendall Statistic (S):		-13	1	-11	0	0	0	-13
Confidence Factor:		99.2%	50.0%	97.2%	39.3%	39.3%	39.3%	99.2%
Concentration Trend:		Decreasing	No Trend	Decreasing	Stable	Stable	Stable	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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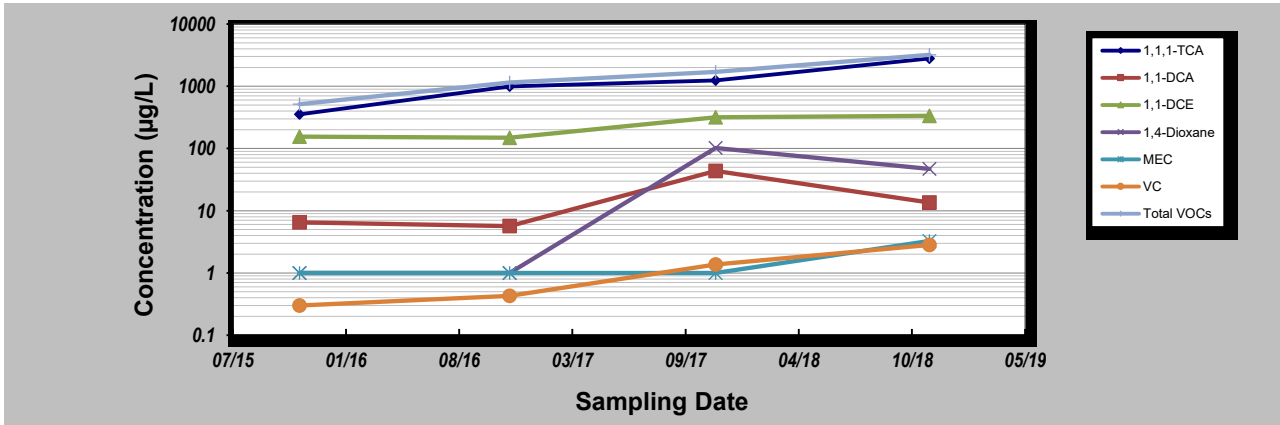
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW5**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW5 CONCENTRATION (µg/L)						
1	10-Nov-15	354	6.51	155	1	1	0.3	515.51
2	15-Nov-16	997	5.66	149	1	1	0.43	1152.09
3	14-Nov-17	1240	43.6	318	102	1	1.37	1704.97
4	27-Nov-18	2800	13.5	335	46.9	3.27	2.82	3202.11
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Coefficient of Variation:		0.77	1.03	0.42	1.27	0.72	0.94	0.70
Mann-Kendall Statistic (S):		6	2	4	3	3	6	6
Confidence Factor:		95.8%	62.5%	83.3%	72.9%	72.9%	95.8%	95.8%
Concentration Trend:		Increasing	No Trend	No Trend	No Trend	No Trend	Increasing	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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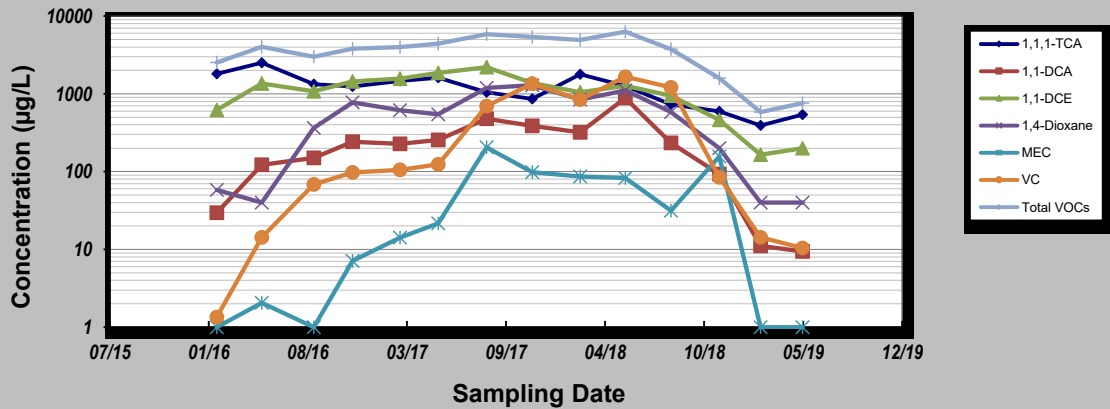
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW6**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW6 CONCENTRATION (µg/L)						
1	16-Feb-16	1810	29.6	621	58.3	1	1.35	2520.25
2	17-May-16	2510	122	1360	40	2.06	14.3	4009.99
3	30-Aug-16	1330	150	1080	365	1	68.5	2995.94
4	16-Nov-16	1240	242	1440	777	7.13	97.4	3806.34
5	20-Feb-17	1460	227	1570	614	14.2	105	3993.5
6	8-May-17	1610	255	1860	544	21.7	124	4418.96
7	14-Aug-17	1050	479	2200	1190	205	695	5835.71
8	14-Nov-17	860	387	1380	1290	98	1350	5391.8
9	19-Feb-18	1780	320	1050	845	86.2	843	4937.26
10	21-May-18	1260	883	1270	1110	83	1660	6289.92
11	21-Aug-18	729	233	948	582	31.5	1210	3742.84
12	27-Nov-18	593	92.8	462	200	156	84.8	1589.61
13	18-Feb-19	392	11.1	165	40	1	14.3	582.4
14	14-May-19	539	9.42	200	40	1	10.4	758.82
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Coefficient of Variation:		0.48	0.94	0.54	0.81	1.30	1.31	0.49
Mann-Kendall Statistic (S):		-59	1	-33	-2	21	24	-7
Confidence Factor:		100.0%	50.0%	96.0%	52.2%	86.0%	89.4%	62.6%
Concentration Trend:		Decreasing	No Trend	Decreasing	Stable	No Trend	No Trend	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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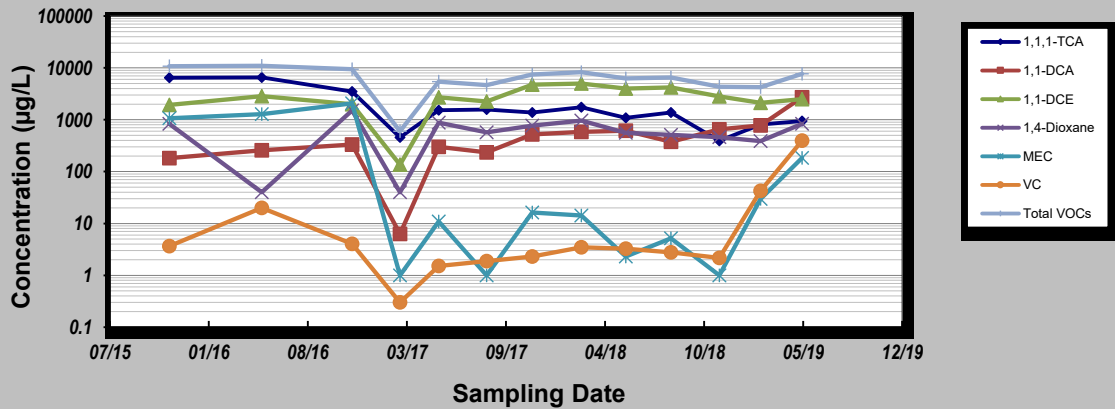
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW7
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW7 CONCENTRATION (µg/L)						
1	12-Nov-15	6470	181	1940	834	1070	3.64	10774.33
2	17-May-16	6560	257	2850	40	1280	19.9	10974.74
3	15-Nov-16	3490	333	2000	1510	2070	4.05	9429.8
4	20-Feb-17	457	6.29	136	40	1	0.3	600.5
5	9-May-17	1530	300	2700	883	10.9	1.51	5428.14
6	14-Aug-17	1580	236	2260	573	1	1.87	4665.41
7	14-Nov-17	1380	520	4740	771	16.2	2.3	7435.98
8	21-Feb-18	1740	584	4990	960	14.3	3.48	8301.78
9	22-May-18	1090	614	3980	562	2.3	3.25	6257.3
10	21-Aug-18	1380	377	4220	513	5.18	2.77	6504.9
11	27-Nov-18	393	651	2830	463	1	2.16	4344.33
12	18-Feb-19	814	776	2120	389	29.9	42.7	4247.02
13	13-May-19	946	2710	2500	836	184	396	7718.8
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Coefficient of Variation:		0.98	1.16	0.46	0.61	1.86	2.91	0.44
Mann-Kendall Statistic (S):		-43	58	16	-11	-11	14	-24
Confidence Factor:		99.6%	>99.9%	81.6%	72.5%	72.5%	78.2%	91.8%
Concentration Trend:		Decreasing	Increasing	No Trend	Stable	No Trend	No Trend	Prob. Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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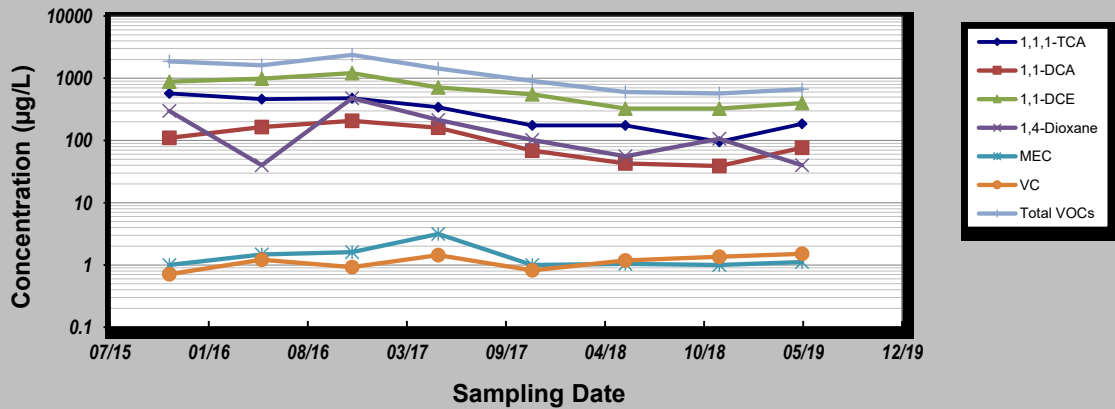
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW8**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW8 CONCENTRATION (µg/L)						
1	12-Nov-15	571	110	886	299	1	0.71	1870.02
2	17-May-16	463	165	984	40	1.47	1.21	1618.02
3	15-Nov-16	476	207	1210	479	1.61	0.92	2379.1
4	8-May-17	342	161	711	215	3.15	1.44	1437.89
5	14-Nov-17	174	68.8	554	102	1	0.82	901.86
6	21-May-18	174	42.9	326	55.8	1.04	1.18	602.35
7	27-Nov-18	95.5	38.9	326	107	1	1.35	570.38
8	13-May-19	185	76.6	401	40	1.11	1.51	666.77
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Coefficient of Variation:		0.57	0.58	0.49	0.93	0.52	0.26	0.54
Mann-Kendall Statistic (S):		-19	-14	-17	-11	-1	14	-20
Confidence Factor:		98.9%	94.6%	97.7%	88.7%	50.0%	94.6%	99.3%
Concentration Trend:		Decreasing	Prob. Decreasing	Decreasing	Stable	Stable	Prob. Increasing	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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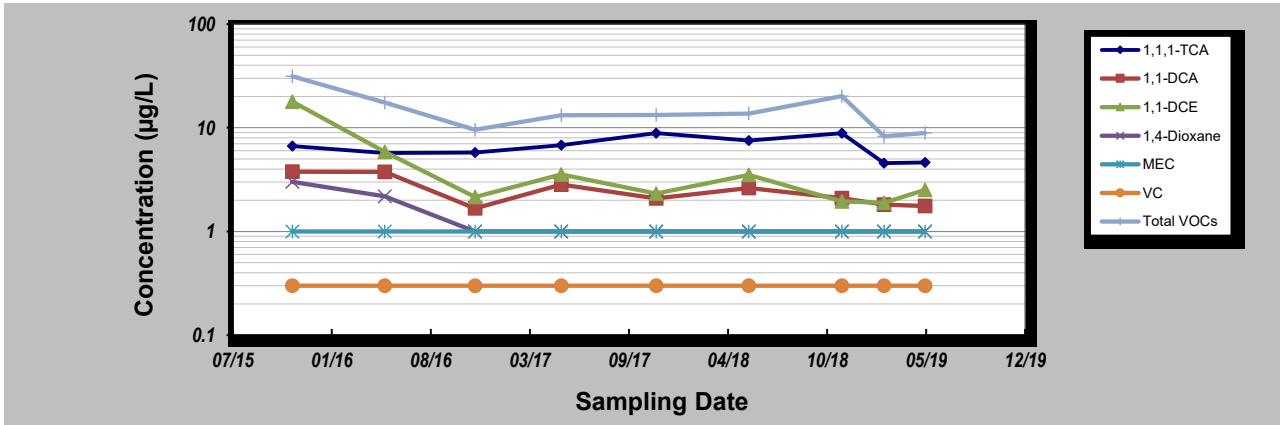
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW9**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW9 CONCENTRATION (µg/L)						
1	12-Nov-15	6.66	3.77	17.9	3.01	1	0.3	31.34
2	17-May-16	5.71	3.76	5.85	2.18	1	0.3	17.5
3	15-Nov-16	5.76	1.67	2.15	1	1	0.3	9.58
4	8-May-17	6.81	2.83	3.55	1	1	0.3	13.19
5	16-Nov-17	8.88	2.08	2.32	1	1	0.3	13.28
6	22-May-18	7.53	2.62	3.52	1	1	0.3	13.67
7	26-Nov-18	8.87	2.1	1.95	1	1	0.3	20.21
8	19-Feb-19	4.56	1.82	1.89	1	1	0.3	8.27
9	13-May-19	4.63	1.76	2.52	1	1	0.3	8.91
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Coefficient of Variation:		0.24	0.33	1.11	0.54	0.00	0.00	0.48
Mann-Kendall Statistic (S):		0	-20	-20	-15	0	0	-12
Confidence Factor:		46.0%	97.8%	97.8%	92.5%	46.0%	46.0%	87.0%
Concentration Trend:		Stable	Decreasing	Decreasing	Prob. Decreasing	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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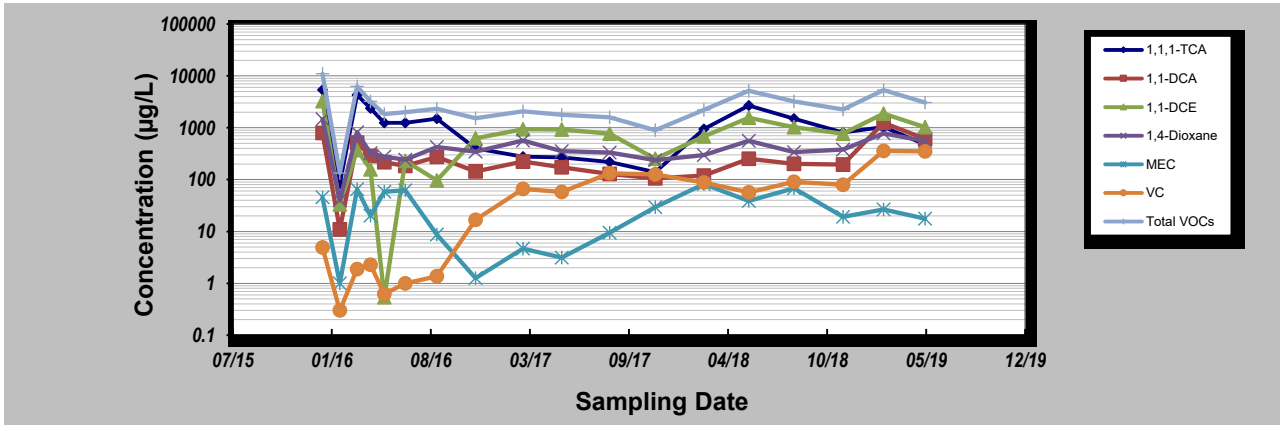
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW10**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW10 CONCENTRATION (µg/L)						
1	12-Jan-16	5370	796	3260	1470	45.7	4.93	10952.08
2	16-Feb-16	82.8	10.9	33.3	40	1	0.3	134.27
3	22-Mar-16	4290	515	372	820	65.1	1.87	6238.91
4	18-Apr-16	2380	285	157	324	20.2	2.28	3215.72
5	16-May-16	1250	217	0.54	277	58.5	0.62	1841.93
6	27-Jun-16	1250	184	230	242	61.9	1	1992.72
7	30-Aug-16	1500	274	96.8	425	8.69	1.37	2330.94
8	16-Nov-16	399	144	625	346	1.26	16.7	1533.16
9	20-Feb-17	278	224	931	568	4.69	66.3	2074.58
10	9-May-17	267	172	927	353	3.14	57.8	1780.92
11	14-Aug-17	219	129	766	333	9.48	132	1596.69
12	14-Nov-17	139	106	252	238	29.3	126	898.54
13	20-Feb-18	945	120	681	296	82	87.6	2212.79
14	22-May-18	2690	253	1560	560	38.8	56.8	5162.11
15	21-Aug-18	1490	201	1030	339	68.0	90.7	3222.07
16	28-Nov-18	812	195	772	379	19.2	79.4	2259.04
17	18-Feb-19	1040	1250	1870	781	26.5	358	5339.38
18	13-May-19	477	609	1030	553	17.6	351	3048.41
19								
20								
Coefficient of Variation:		1.06	0.96	0.99	0.68	0.84	1.37	0.81
Mann-Kendall Statistic (S):		-36	-9	66	17	9	97	11
Confidence Factor:		90.6%	61.7%	99.4%	72.5%	61.7%	>99.9%	64.6%
Concentration Trend:		Prob. Decreasing	Stable	Increasing	No Trend	No Trend	Increasing	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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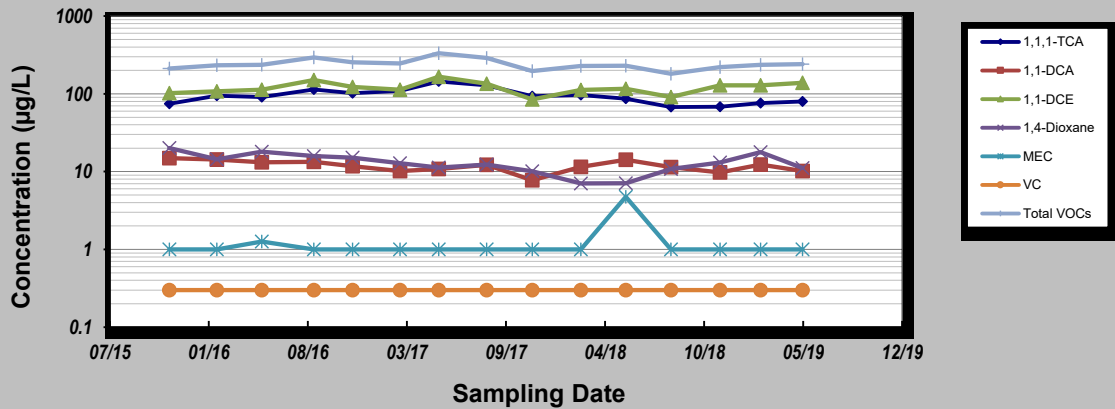
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW11**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW11 CONCENTRATION (µg/L)						
1	12-Nov-15	74.3	14.9	102	20.1	1	0.3	211.79
2	16-Feb-16	94.8	14.3	108	14.4	1	0.3	232.12
3	17-May-16	90.7	13.2	113	18	1.26	0.3	236.75
4	30-Aug-16	114	13.4	150	15.8	1	0.3	293.91
5	16-Nov-16	102	11.7	123	15.1	1	0.3	253.66
6	20-Feb-17	109	10.2	113	12.8	1	0.3	245.76
7	9-May-17	144	10.8	166	11.3	1	0.3	332.52
8	14-Aug-17	129	12.2	135	12.3	1	0.3	290.19
9	14-Nov-17	93.1	7.74	84.8	10.1	1	0.3	196.16
10	20-Feb-18	96.4	11.5	112	7.05	1	0.3	227.4
11	22-May-18	86.8	14.2	116	7.09	4.74	0.3	229.93
12	21-Aug-18	67.6	11.4	90.7	10.8	1	0.3	181.16
13	28-Nov-18	68.3	9.77	129	13.1	1	0.3	220.92
14	18-Feb-19	76.1	12.3	129	17.8	1	0.3	236.59
15	14-May-19	79.8	10.2	139	11.1	1	0.3	240.93
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17								
18								
19								
20								
Coefficient of Variation:		0.23	0.16	0.18	0.29	0.76	0.00	0.16
Mann-Kendall Statistic (S):		-27	-44	21	-45	-3	0	-11
Confidence Factor:		89.9%	98.4%	83.6%	98.6%	53.9%	48.0%	68.7%
Concentration Trend:		Stable	Decreasing	No Trend	Decreasing	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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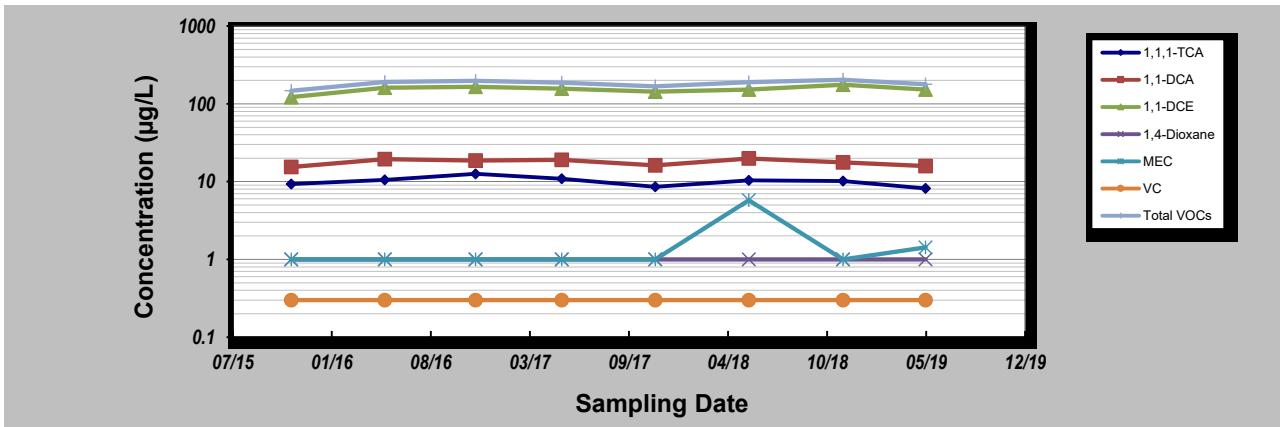
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW13**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW13 CONCENTRATION (µg/L)						
1	10-Nov-15	9.31	15.4	122	1	1	0.3	147.15
2	17-May-16	10.5	19.4	161	1	1	0.3	191.3
3	16-Nov-16	12.6	18.7	166	1	1	0.3	197.62
4	9-May-17	10.9	19	157	1	1	0.3	187.68
5	14-Nov-17	8.59	16.2	143	1	1	0.3	168.14
6	22-May-18	10.4	19.8	152	1	5.76	0.3	189.63
7	28-Nov-18	10.2	17.7	176	1	1	0.3	203.9
8	14-May-19	8.16	15.8	153	1	1.43	0.3	178.39
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Coefficient of Variation:		0.14	0.10	0.11	0.00	1.01	0.00	0.10
Mann-Kendall Statistic (S):		-10	-2	4	0	9	0	4
Confidence Factor:		86.2%	54.8%	64.0%	45.2%	83.2%	45.2%	64.0%
Concentration Trend:		Stable	Stable	No Trend	Stable	No Trend	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

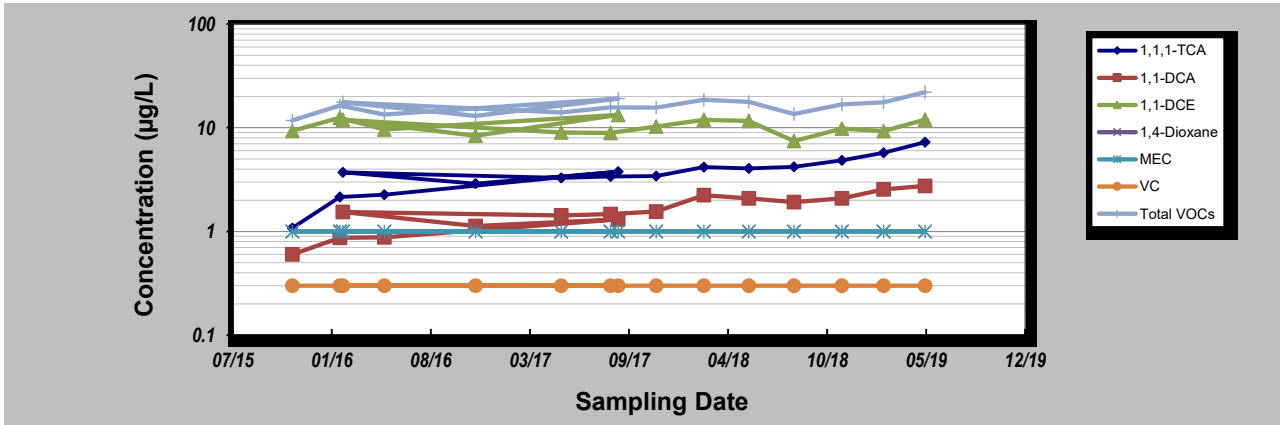
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: May 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW14R
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW14R CONCENTRATION (µg/L)						
1	12-Nov-15	1.08	0.6	9.35	1	1	0.3	11.77
2	16-Feb-16	2.15	0.87	12.5	1	1	0.3	16.36
3	16-May-16	2.26	0.88	9.63	1	1	0.3	13.41
4	31-Aug-17	3.78	1.31	13.3	1	1	0.3	19.07
5	16-Nov-16	2.89	1.13	8.36	1	1	0.3	13
6	22-Feb-16	3.72	1.54	11.9	1	1	0.3	17.57
7	8-May-17	3.28	1.43	8.98	1	1	0.3	14.02
8	16-Aug-17	3.38	1.47	8.92	1	1	0.3	15.68
9	16-Nov-17	3.42	1.56	10.3	1	1	0.3	15.61
10	20-Feb-18	4.18	2.24	11.9	1	1	0.3	18.63
11	22-May-18	4.05	2.08	11.6	1	1	0.3	17.73
12	21-Aug-18	4.2	1.92	7.44	1	1	0.3	13.56
13	26-Nov-18	4.85	2.08	9.84	1	1	0.3	16.77
14	18-Feb-19	5.75	2.54	9.27	1	1	0.3	17.56
15	13-May-19	7.26	2.75	12	1	1	0.3	22.01
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17								
18								
19								
20								
Coefficient of Variation:		0.40	0.39	0.17	0.00	0.00	0.00	0.17
Mann-Kendall Statistic (S):		87	90	-6	0	0	0	37
Confidence Factor:		>99.9%	>99.9%	59.6%	48.0%	48.0%	48.0%	96.3%
Concentration Trend:		Increasing	Increasing	Stable	Stable	Stable	Stable	Increasing



Notes:

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- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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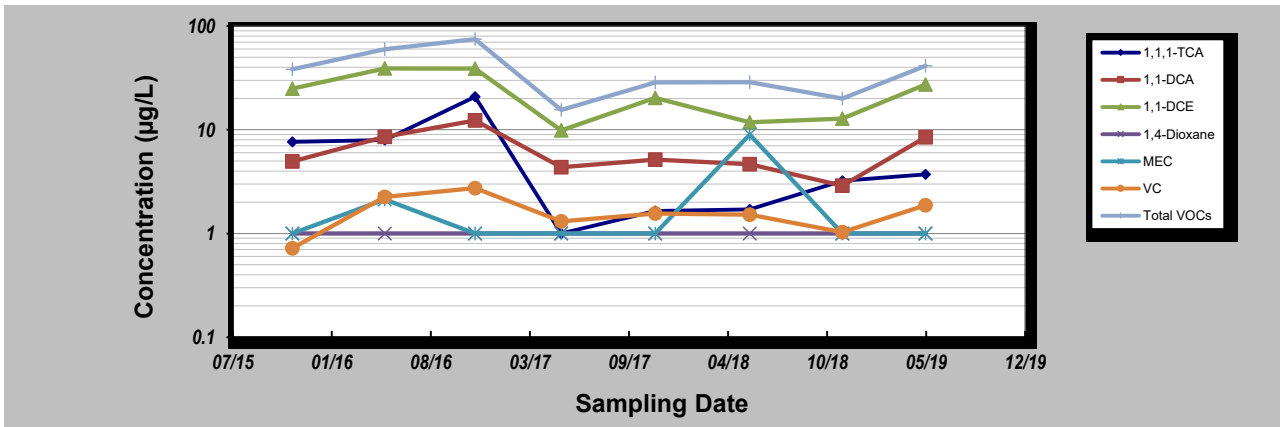
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW15R**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW15R CONCENTRATION (µg/L)						
1	12-Nov-15	7.64	4.94	24.9	1	1	0.72	38.2
2	17-May-16	7.95	8.54	39	1	2.13	2.25	59.87
3	15-Nov-16	20.8	12.3	38.9	1	1	2.74	74.74
4	8-May-17	1	4.35	9.86	1	1	1.31	15.52
5	14-Nov-17	1.65	5.15	20.3	1	1	1.56	28.66
6	24-May-18	1.71	4.66	11.8	1	8.98	1.52	28.67
7	27-Nov-18	3.22	2.89	12.8	1	1	1.03	19.94
8	14-May-19	3.72	8.46	27.3	1	1	1.87	41.35
9								
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19								
20								
Coefficient of Variation:		1.10	0.48	0.50	0.00	1.31	0.40	0.53
Mann-Kendall Statistic (S):		-2	-6	-6	0	-1	0	-4
Confidence Factor:		54.8%	72.6%	72.6%	45.2%	50.0%	45.2%	64.0%
Concentration Trend:		No Trend	Stable	Stable	Stable	No Trend	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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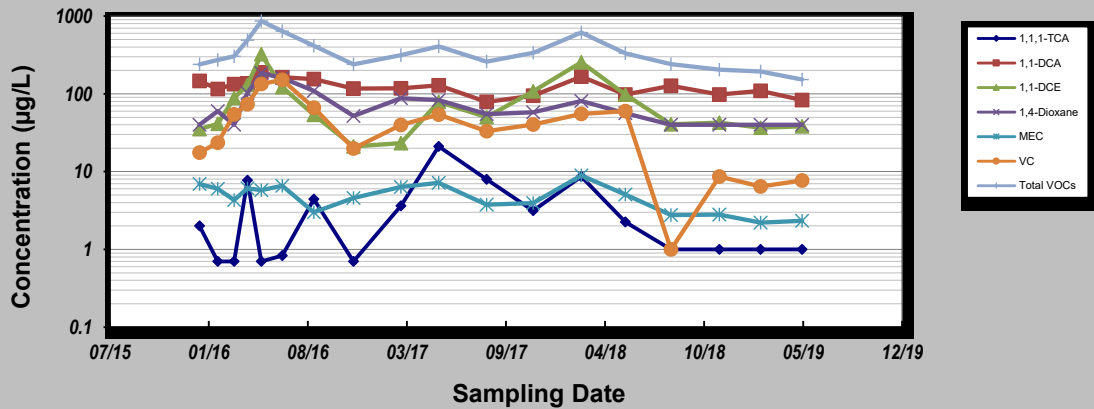
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW16**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW16 CONCENTRATION (µg/L)						
1	12-Jan-16	2	146	35.1	40	6.93	17.6	239.95
2	18-Feb-16	0.7	115	41.3	59.9	6.01	23.5	272.65
3	22-Mar-16	0.7	133	88.3	40	4.3	54.3	303.41
4	18-Apr-16	7.75	136	130	103	6.08	73.7	488.19
5	16-May-16	0.7	188	322	184	5.77	134	860.93
6	27-Jun-16	0.83	163	122	160	6.59	151	637.28
7	30-Aug-16	4.43	155	53.6	109	3	66.4	415.92
8	18-Nov-16	0.7	117	21.1	51.9	4.58	19.8	239.63
9	22-Feb-17	3.63	118	23.2	87.9	6.37	39.9	313.88
10	9-May-17	21.1	129	78.8	82.9	7.18	54.2	408.36
11	14-Aug-17	7.98	78.6	50.1	54.9	3.76	33	260.13
12	16-Nov-17	3.15	94.9	108	57.8	3.93	40.3	336.99
13	21-Feb-18	8.61	167	254	80.8	8.93	55.1	611.61
14	21-May-18	2.25	97.6	98	56.3	5.08	59.8	331.66
15	21-Aug-18	1	127	40.6	40	2.76	1	241.12
16	27-Nov-18	1	98.1	42.6	40	2.81	8.62	203.82
17	18-Feb-19	1	109	36.6	40	2.21	6.44	193.78
18	13-May-19	1	83	38.2	40	2.33	7.7	152.66
19								
20								
Coefficient of Variation:		1.34	0.24	0.92	0.57	0.39	0.88	0.51
Mann-Kendall Statistic (S):		15	-55	-19	-52	-61	-43	-49
Confidence Factor:		70.0%	98.0%	75.0%	97.4%	98.9%	94.4%	96.6%
Concentration Trend:		No Trend	Decreasing	Stable	Decreasing	Decreasing	Prob. Decreasing	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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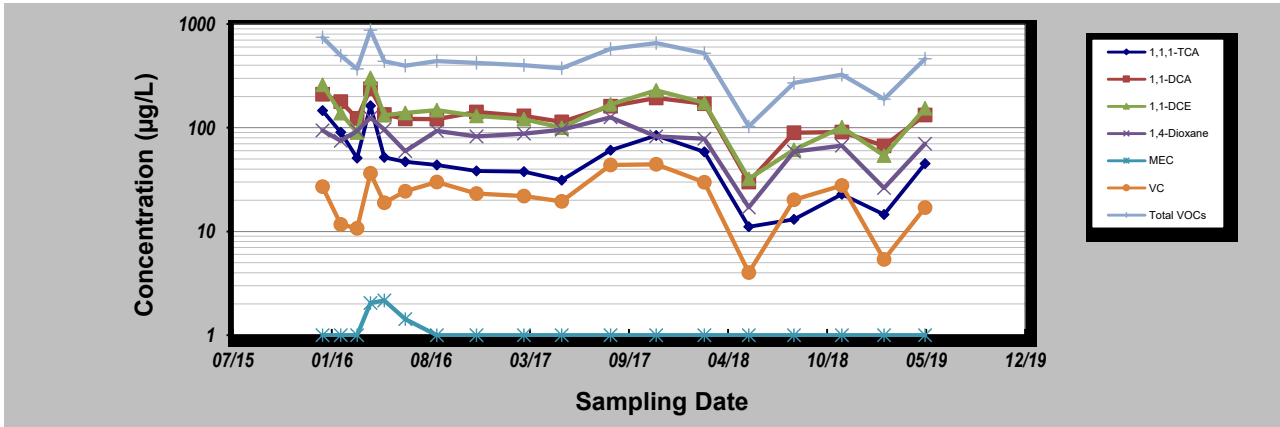
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW17**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW17 CONCENTRATION (µg/L)						
1	12-Jan-16	146	210	260	94.3	1	27.1	742.43
2	18-Feb-16	90.3	179	138	75	1	11.7	496.14
3	22-Mar-16	50.9	123	89.8	93.1	1	10.7	368.66
4	18-Apr-16	163	238	303	125	2.04	36.4	871.9
5	16-May-16	51.8	134	132	96.4	2.16	18.9	437.93
6	27-Jun-16	47	122	139	59.5	1.43	24.4	395.77
7	30-Aug-16	43.8	121	148	93.1	1	29.9	438.36
8	18-Nov-16	38.4	142	130	82.5	1	23.2	422.09
9	22-Feb-17	37.7	130	121	87.9	1	21.9	400.53
10	9-May-17	31.2	114	100	95.7	1	19.5	374.47
11	16-Aug-17	60.6	161	168	126	1	43.7	576.11
12	16-Nov-17	84	194	229	82.6	1	44.4	653.85
13	21-Feb-18	58.7	171	174	78.3	1	29.8	523.75
14	22-May-18	11.1	30	32.2	17.1	1	4.02	103.05
15	21-Aug-18	13.1	89.6	61.2	59.0	1	20.2	270.49
16	26-Nov-18	22.9	91	101	67.3	1	27.7	324.95
17	19-Feb-19	14.6	67	53.9	26.2	1	5.38	189.08
18	13-May-19	45.2	133	154	70	1	17	462.63
19								
20								
Coefficient of Variation:		0.75	0.38	0.49	0.35	0.32	0.50	0.41
Mann-Kendall Statistic (S):		-75	-57	-37	-60	-28	-11	-47
Confidence Factor:		99.8%	98.4%	91.2%	98.8%	84.4%	64.6%	95.9%
Concentration Trend:		Decreasing	Decreasing	Prob. Decreasing	Decreasing	Stable	Stable	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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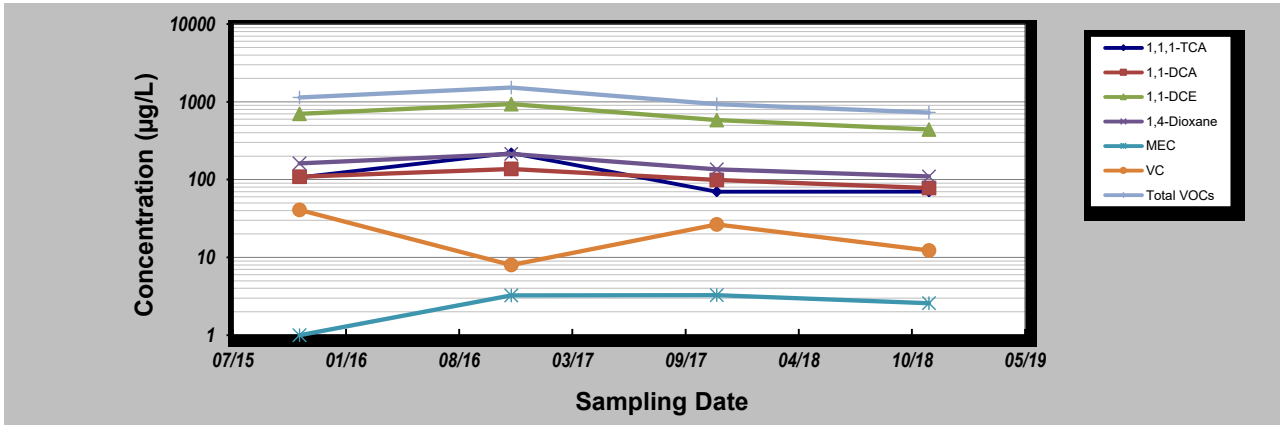
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW18**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW18 CONCENTRATION (µg/L)						
1	10-Nov-15	107	109	702	162	1	40.8	1136.14
2	18-Nov-16	220	137	936	214	3.25	7.97	1526.24
3	16-Nov-17	70.1	99.2	584	135	3.27	26.5	935
4	26-Nov-18	70	77.9	441	110	2.58	12.3	727.71
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12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.61	0.23	0.31	0.29	0.42	0.68	0.31
Mann-Kendall Statistic (S):		-4	-4	-4	-4	2	-2	-4
Confidence Factor:		83.3%	83.3%	83.3%	83.3%	62.5%	62.5%	83.3%
Concentration Trend:		Stable	Stable	Stable	Stable	No Trend	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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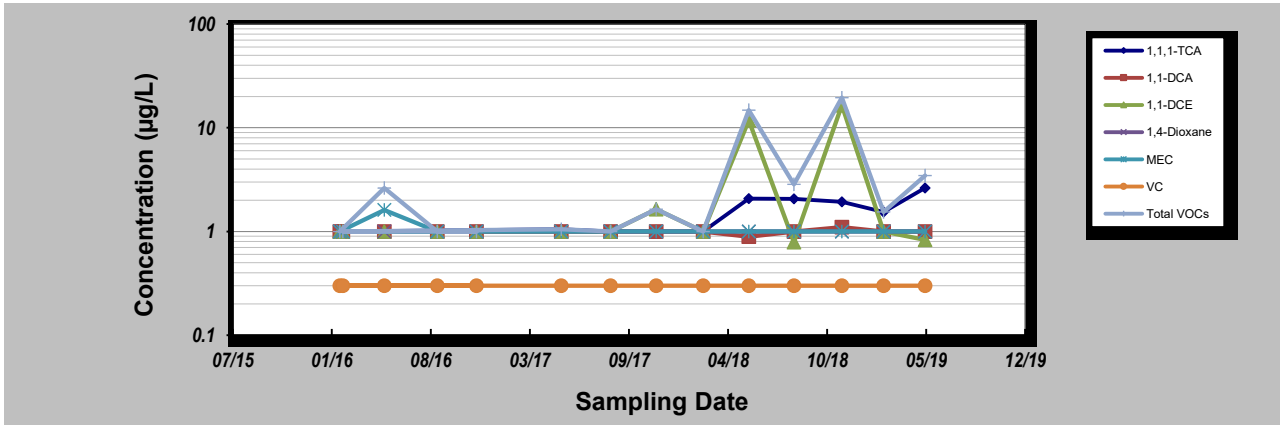
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW23**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW23 CONCENTRATION (µg/L)						
1	16-Feb-16	1	1	1	1	1	0.3	1
2	16-May-16	1.01	1	1	1	1.61	0.3	2.62
3	31-Aug-16	1	1	1	1	1	0.3	1
4	18-Nov-16	1	1	1	1	1	0.3	1
5	22-Feb-16	1	1	1	1	1	0.3	1
6	8-May-17	1.05	1	1	1	1	0.3	1.05
7	16-Aug-17	1	1	1	1	1	0.3	1
8	16-Nov-17	1	1	1.64	1	1	0.3	1.64
9	19-Feb-18	1	1	1	1	1	0.3	1
10	22-May-18	2.07	0.89	11.8	1	1	0.3	14.76
11	21-Aug-18	2.06	1	0.79	1	1	0.3	2.85
12	26-Nov-18	1.93	1.1	16.5	1	1	0.3	19.53
13	18-Feb-19	1.54	1	1	1	1	0.3	1.54
14	13-May-19	2.63	1	0.83	1	1	0.3	3.46
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.41	0.04	1.68	0.00	0.16	0.00	1.51
Mann-Kendall Statistic (S):		40	3	3	0	-11	0	40
Confidence Factor:		98.5%	54.3%	54.3%	47.8%	70.5%	47.8%	98.5%
Concentration Trend:		Increasing	No Trend	No Trend	Stable	Stable	Stable	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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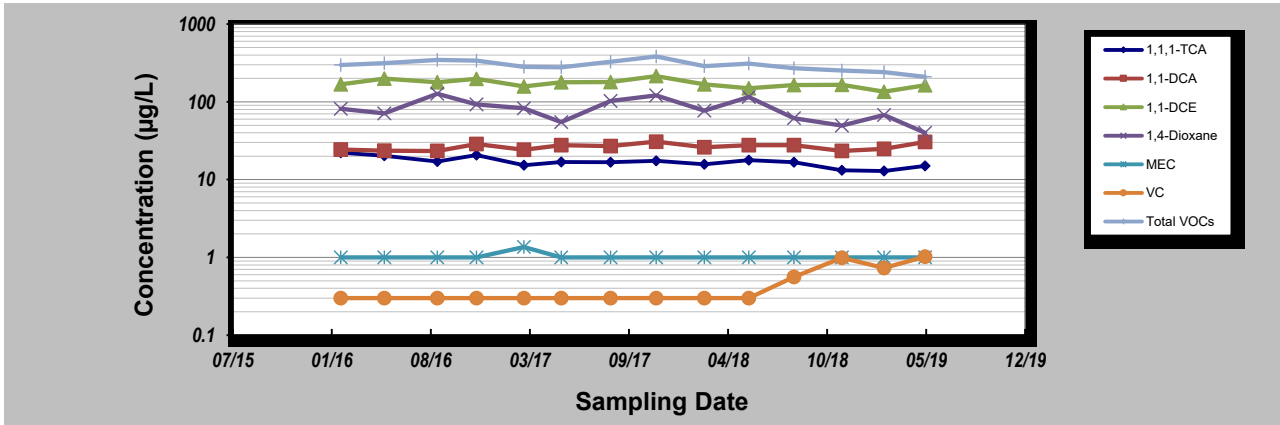
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: May 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW24
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW24 CONCENTRATION (µg/L)						
1	18-Feb-16	22.2	24.4	168	81.4	1	0.3	296.55
2	16-May-16	20.3	23.6	199	71	1	0.3	313.9
3	31-Aug-16	17.1	23.3	178	127	1	0.3	345.4
4	18-Nov-16	20.7	28.7	197	92.8	1	0.3	339.2
5	22-Feb-17	15.3	24.2	158	82.6	1.36	0.3	281.46
6	8-May-17	16.9	27.8	178	54.7	1	0.3	277.4
7	16-Aug-17	16.7	27	180	103	1	0.3	328.21
8	16-Nov-17	17.4	30.8	214	121	1	0.3	383.2
9	21-Feb-18	15.7	26	168	77	1	0.3	286.7
10	22-May-18	17.8	27.7	149	115	1	0.3	309.5
11	21-Aug-18	16.7	27.7	164	61.4	1	0.56	270.36
12	26-Nov-18	13.2	23.4	166	49.4	1	0.99	252.99
13	19-Feb-19	12.9	24.9	135	67.9	1	0.73	241.43
14	13-May-19	15	30.4	163	40	1	1.02	209.42
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18								
19								
20								
Coefficient of Variation:		0.16	0.10	0.12	0.33	0.09	0.60	0.15
Mann-Kendall Statistic (S):		-52	18	-37	-31	-5	44	-47
Confidence Factor:		99.8%	82.1%	97.6%	95.0%	58.5%	99.2%	99.5%
Concentration Trend:		Decreasing	No Trend	Decreasing	Prob. Decreasing	Stable	Increasing	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

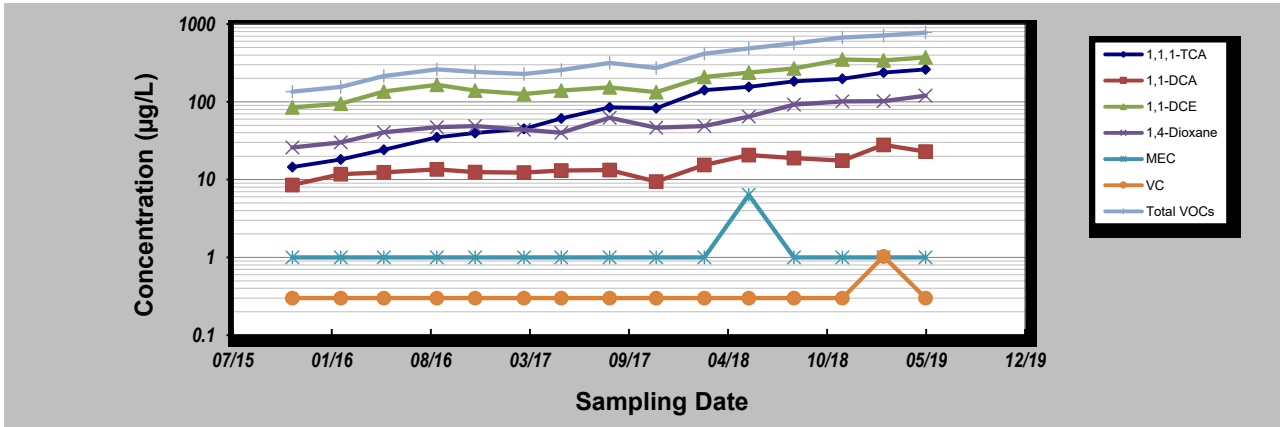
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW25
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW25 CONCENTRATION (µg/L)						
1	12-Nov-15	14.5	8.54	84.8	25.9	1	0.3	135.06
2	18-Feb-16	18.1	11.7	94.5	30.1	1	0.3	155.81
3	15-May-16	24.2	12.4	136	40.5	1	0.3	214.4
4	30-Aug-16	34.9	13.5	165	47.2	1	0.3	262.16
5	15-Nov-16	39.8	12.5	140	48.7	1	0.3	242.56
6	22-Feb-17	44.9	12.3	126	43.9	1	0.3	228.54
7	8-May-17	61.2	13.1	140	40	1	0.3	255.68
8	14-Aug-17	84.6	13.3	154	62.3	1	0.3	317.09
9	16-Nov-17	82.7	9.46	133	46.6	1	0.3	272.8
10	21-Feb-18	141	15.4	209	48.7	1	0.3	415.36
11	22-May-18	156	20.7	238	64.5	6.38	0.3	487.16
12	21-Aug-18	183	18.9	269	92.1	1	0.3	564.37
13	27-Nov-18	198	17.5	350	101	1	0.3	667.66
14	18-Feb-19	237	28	341	102	1	1.03	710.25
15	14-May-19	261	22.9	372	120	1	0.3	777.12
16								
17								
18								
19								
20								
Coefficient of Variation:		0.79	0.35	0.48	0.48	1.02	0.54	0.55
Mann-Kendall Statistic (S):		103	71	80	84	6	12	95
Confidence Factor:		>99.9%	>99.9%	>99.9%	>99.9%	59.6%	70.4%	>99.9%
Concentration Trend:		Increasing	Increasing	Increasing	Increasing	No Trend	No Trend	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $>95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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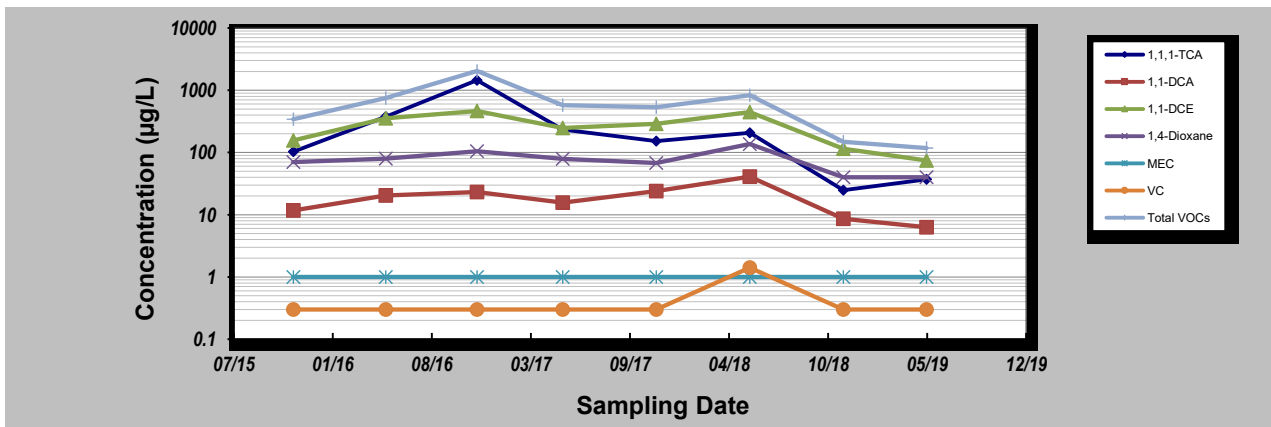
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW26**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW26 CONCENTRATION (µg/L)						
1	12-Nov-15	103	11.7	157	70.3	1	0.3	342
2	17-May-16	376	20.4	354	80	1	0.3	750.4
3	17-Nov-16	1450	23.2	464	105	1	0.3	2042.2
4	9-May-17	234	15.6	247	78.9	1	0.3	575.5
5	14-Nov-17	153	24	290	68.1	1	0.3	535.1
6	22-May-18	208	40.9	445	137	1	1.41	832.31
7	27-Nov-18	24.8	8.59	115	40	1	0.3	148.39
8	14-May-19	37.1	6.29	74.4	40	1	0.3	117.79
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Coefficient of Variation:		1.45	0.59	0.55	0.42	0.00	0.89	0.92
Mann-Kendall Statistic (S):		-12	-2	-8	-9	0	3	-10
Confidence Factor:		91.1%	54.8%	80.1%	83.2%	45.2%	59.4%	86.2%
Concentration Trend:		Prob. Decreasing	Stable	Stable	Stable	Stable	No Trend	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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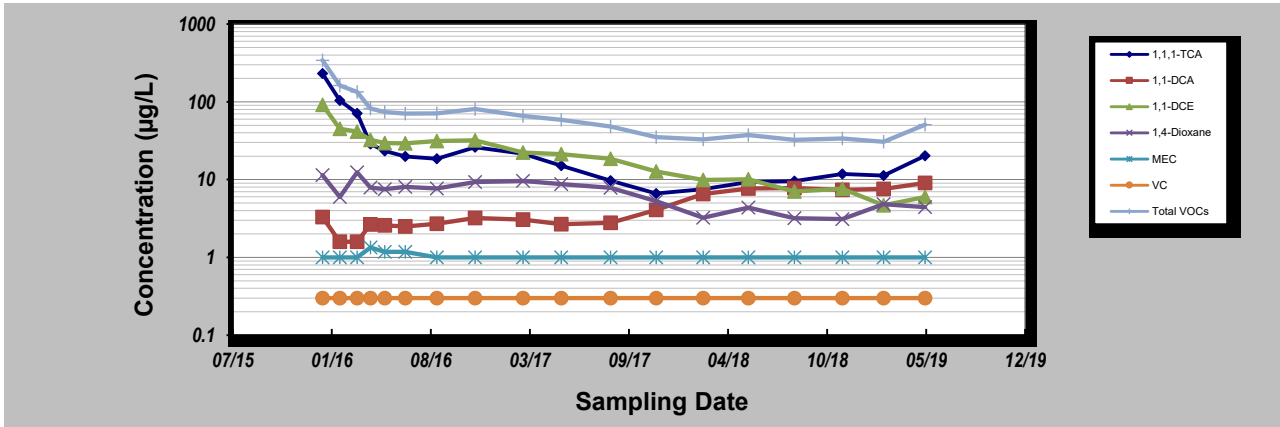
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW28**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW28 CONCENTRATION (µg/L)						
1	12-Jan-16	231	3.31	91.5	11.4	1	0.3	342.16
2	16-Feb-16	104	1.59	44.9	5.96	1	0.3	162.3
3	22-Mar-16	71.2	1.59	41.5	12.4	1	0.3	134.12
4	18-Apr-16	28.6	2.66	32.5	7.93	1.34	0.3	81.92
5	17-May-16	23.4	2.58	29.4	7.52	1.18	0.3	74
6	27-Jun-16	19.9	2.5	29.2	8.08	1.18	0.3	70.57
7	30-Aug-16	18.5	2.7	31.3	7.7	1	0.3	70.9
8	15-Nov-16	26	3.22	32.0	9.29	1	0.3	80.81
9	20-Feb-17	21.5	3.06	22.3	9.62	1	0.3	65.83
10	8-May-17	15.1	2.68	21.2	8.74	1	0.3	58.84
11	16-Aug-17	9.72	2.78	18.5	7.84	1	0.3	48.18
12	16-Nov-17	6.63	4.08	12.7	5.28	1	0.3	35.22
13	19-Feb-18	7.52	6.51	9.91	3.23	1	0.3	32.9
14	21-May-18	9.32	7.67	10.1	4.38	1	0.3	37.34
15	22-Aug-18	9.54	7.82	7.03	3.19	1	0.3	32.49
16	27-Nov-18	11.8	7.36	7.66	3.11	1	0.3	33.73
17	18-Feb-19	11.3	7.57	4.68	4.84	1	0.3	30.63
18	13-May-19	20.3	9.06	5.99	4.42	1	0.3	50.95
19								
20								
Coefficient of Variation:		1.52	0.57	0.83	0.40	0.09	0.00	0.93
Mann-Kendall Statistic (S):		-91	106	-137	-79	-29	0	-123
Confidence Factor:		>99.9%	>99.9%	>99.9%	99.9%	85.3%	48.5%	>99.9%
Concentration Trend:		Decreasing	Increasing	Decreasing	Decreasing	Stable	Stable	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $>95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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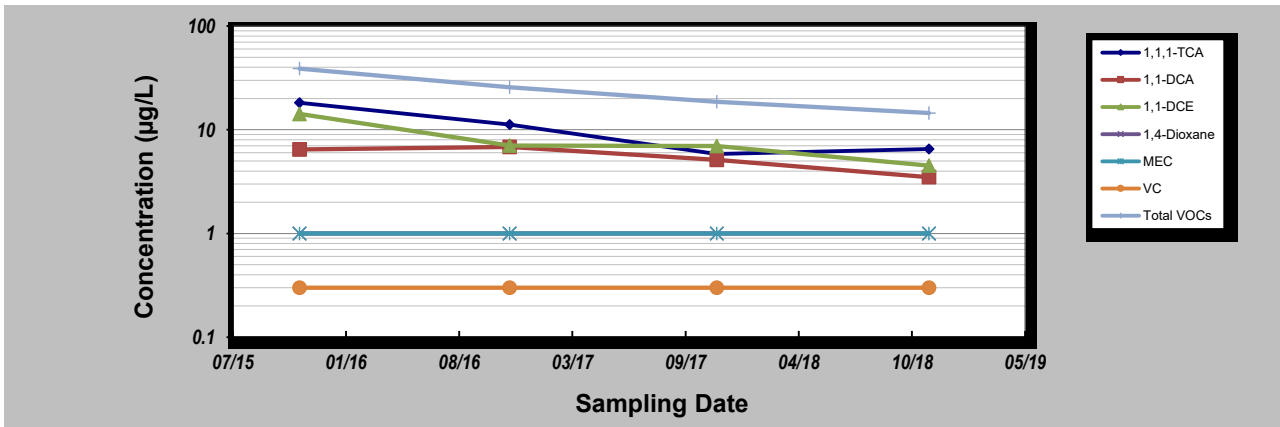
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019**
 Facility Name: **Former Richmond Works Facility**
 Conducted By: **Sheri Knox**

Job ID: **6480199002**
 Constituent: **MW29**
 Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW29 CONCENTRATION (µg/L)						
1	10-Nov-15	18.2	6.44	14.2	1	1	0.3	38.84
2	15-Nov-16	11.2	6.83	7.03	1	1	0.3	25.69
3	16-Nov-17	5.84	5.14	6.96	1	1	0.3	18.64
4	26-Nov-18	6.51	3.49	4.51	1	1	0.3	14.51
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20								
Coefficient of Variation:		0.55	0.28	0.51	0.00	0.00	0.00	0.44
Mann-Kendall Statistic (S):		-4	-4	-6	0	0	0	-6
Confidence Factor:		83.3%	83.3%	95.8%	37.5%	37.5%	37.5%	95.8%
Concentration Trend:		Stable	Stable	Decreasing	Stable	Stable	Stable	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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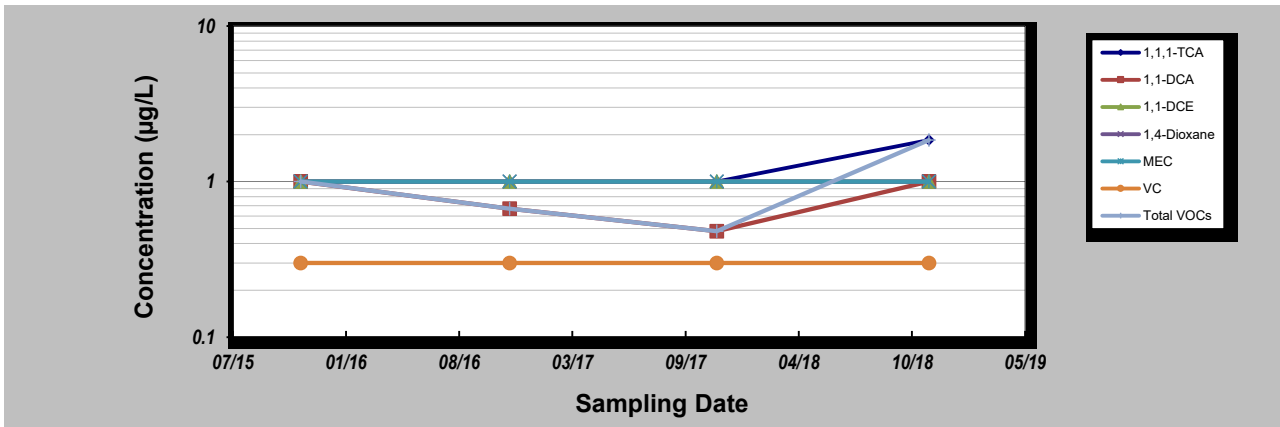
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW30R**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW30R CONCENTRATION (µg/L)						
1	12-Nov-15	1	1	1	1	1	0.3	1
2	15-Nov-16	1	0.67	1	1	1	0.3	0.67
3	16-Nov-17	1	0.48	1	1	1	0.3	0.48
4	26-Nov-18	1.85	1	1	1	1	0.3	1.85
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.35	0.33	0.00	0.00	0.00	0.00	0.61
Mann-Kendall Statistic (S):		3	-1	0	0	0	0	0
Confidence Factor:		72.9%	50.0%	37.5%	37.5%	37.5%	37.5%	37.5%
Concentration Trend:		No Trend	Stable	Stable	Stable	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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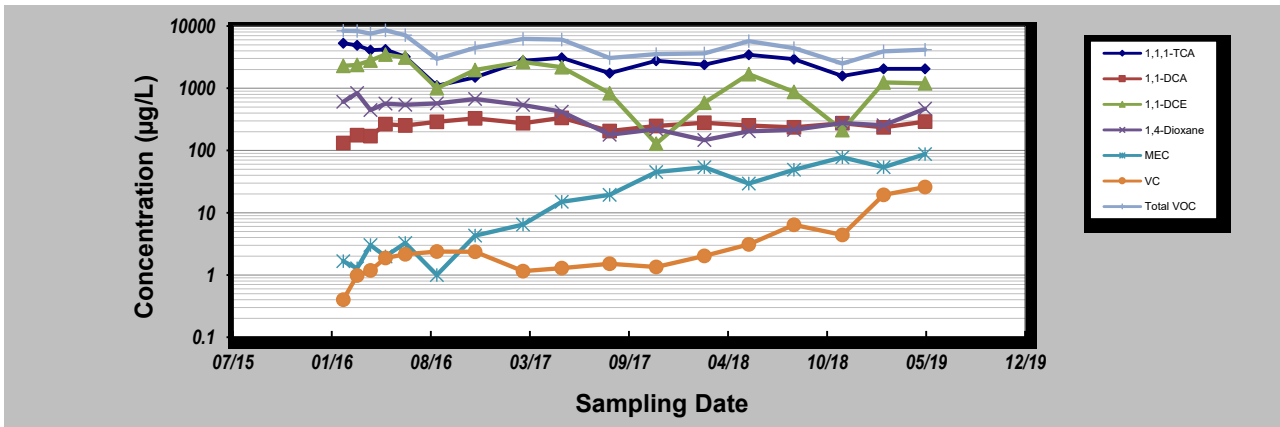
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW33**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOC
Sampling Event	Sampling Date	MW33 CONCENTRATION (µg/L)						
1	23-Feb-16	5300	132	2300	606	1.66	0.4	8344.31
2	22-Mar-16	4880	176	2380	837	1.28	0.98	8279.92
3	18-Apr-16	4110	170	2800	448	3.02	1.18	7537.85
4	18-May-16	4200	266	3490	568	1.99	1.87	8533
5	27-Jun-16	3190	253	3110	544	3.27	2.14	7106.88
6	30-Aug-16	1100	288	1000	569	1	2.38	2963.42
7	15-Nov-16	1500	327	1960	669	4.29	2.35	4462.64
8	20-Feb-17	2760	274	2640	540	6.46	1.15	6226.1
9	9-May-17	3080	335	2170	421	15	1.29	6058.42
10	14-Aug-17	1740	206	832	179	19.3	1.51	3075.39
11	16-Nov-17	2760	247	129	219	45.1	1.34	3555.51
12	21-Feb-18	2400	279	587	147	54.1	2.03	3618.97
13	22-May-18	3440	252	1690	203	29.5	3.1	5716.99
14	21-Aug-18	2930	236	877	214	49	6.4	4415.05
15	27-Nov-18	1580	274	213	276	77.4	4.38	2499.27
16	18-Feb-19	2060	236	1240	254	54	19.4	3917.16
17	13-May-19	2060	291	1200	469	87.6	25.8	4180.22
18								
19								
20								
Coefficient of Variation:		0.42	0.22	0.61	0.48	1.08	1.54	0.39
Mann-Kendall Statistic (S):		-56	32	-62	-62	112	90	-68
Confidence Factor:		98.9%	89.8%	99.5%	99.5%	>99.9%	>99.9%	99.8%
Concentration Trend:		Decreasing	No Trend	Decreasing	Decreasing	Increasing	Increasing	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $>95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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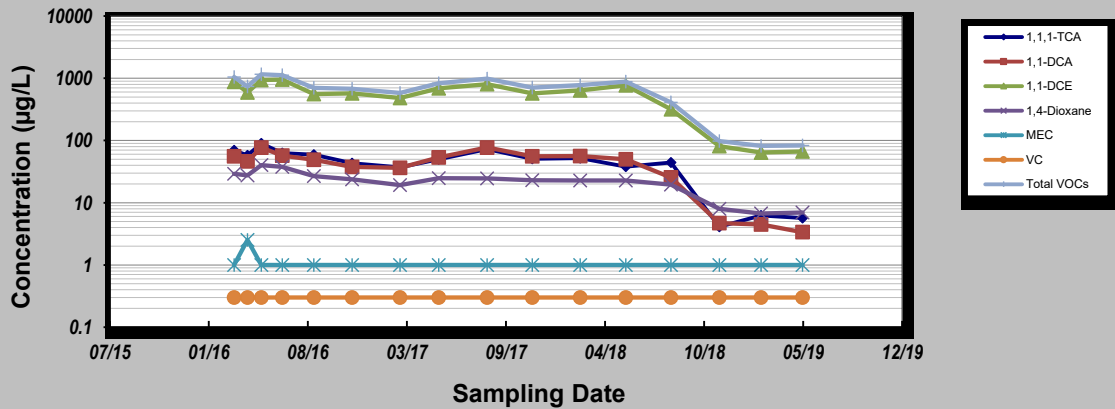
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW34**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW34 CONCENTRATION (µg/L)						
1	22-Mar-16	69.8	55.9	878	29.1	1	0.3	1044.15
2	18-Apr-16	57.7	46.4	593	27.5	2.52	0.3	735.46
3	16-May-16	89.6	76.9	938	40.2	1	0.3	1158.4
4	27-Jun-16	62.6	57.4	952	37.5	1	0.3	1118.92
5	30-Aug-16	59.4	49.2	557	26.7	1	0.3	701.16
6	15-Nov-16	43.3	37.7	571	23.8	1	0.3	675.8
7	20-Feb-17	36.9	36.4	483	19.2	1	0.3	581.57
8	9-May-17	49.7	53.4	692	24.9	1	0.3	828.7
9	15-Aug-17	72.4	77.3	803	24.5	1	0.3	989.04
10	14-Nov-17	50.6	55.6	569	22.9	1	0.3	705.74
11	19-Feb-18	52.1	56.3	638	22.7	1	0.3	776.49
12	22-May-18	37.9	50	769	22.8	1	0.3	886.26
13	21-Aug-18	44.1	25.4	318	19.6	1	0.3	411.16
14	27-Nov-18	4.11	4.7	80.8	7.95	1	0.3	98.11
15	19-Feb-19	6.24	4.48	64.1	6.71	1	0.3	82.01
16	14-May-19	5.66	3.36	66.8	6.97	1	0.3	83.28
17								
18								
19								
20								
Coefficient of Variation:		0.53	0.54	0.53	0.42	0.35	0.00	0.52
Mann-Kendall Statistic (S):		-68	-54	-60	-92	-13	0	-62
Confidence Factor:		99.9%	99.2%	99.7%	>99.9%	70.3%	48.2%	99.8%
Concentration Trend:		Decreasing	Decreasing	Decreasing	Decreasing	Stable	Stable	Decreasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $>95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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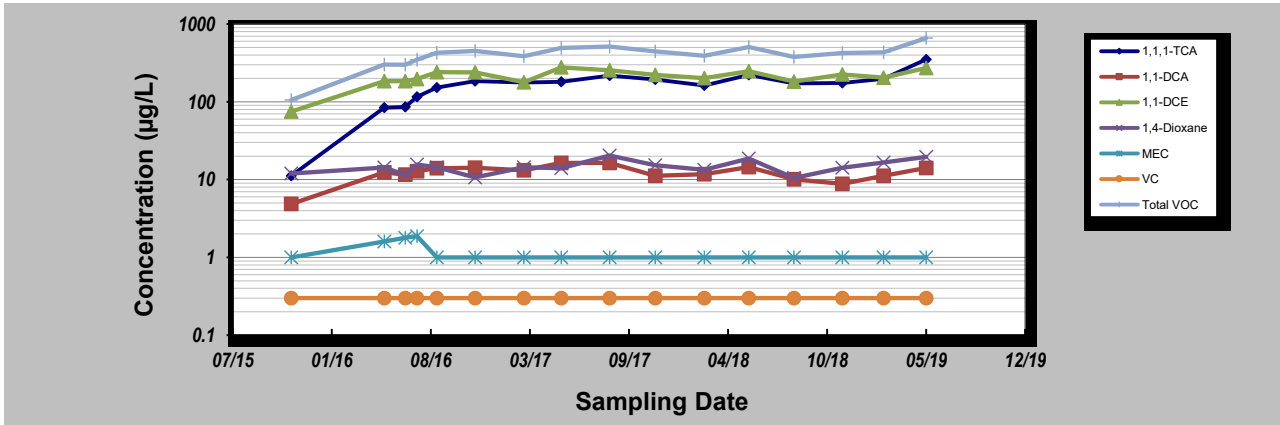
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW35**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOC
Sampling Event	Sampling Date	MW35 CONCENTRATION (µg/L)						
1	10-Nov-15	11.2	4.86	74.9	12	1	0.3	105.54
2	16-May-16	84.5	12.4	184	14.3	1.6	0.3	300.8
3	27-Jun-16	86.1	11.6	185	11.5	1.79	0.3	299.7
4	21-Jul-16	116	12.8	196	15.6	1.88	0.3	347.31
5	30-Aug-16	153	14	241	14.4	1	0.3	426.25
6	15-Nov-16	184	14.2	239	10.7	1	0.3	451.73
7	22-Feb-17	177	13.2	178	14.4	1	0.3	385.92
8	8-May-17	181	16.4	277	14	1	0.3	492.75
9	14-Aug-17	218	16.4	255	20.4	1	0.3	513.81
10	14-Nov-17	194	11.2	222	15.3	1	0.3	445.56
11	21-Feb-18	162	11.7	202	13.4	1	0.3	391.49
12	22-May-18	222	14.5	247	18.7	1	0.3	505.07
13	21-Aug-18	173	10.1	182	10.5	1	0.3	377.51
14	27-Nov-18	175	8.8	225	14.2	1	0.3	425
15	18-Feb-19	197	11.2	205	16.6	1	0.3	431.8
16	15-May-19	351	14.1	272	19.6	1	0.3	658.88
17								
18								
19								
20								
Coefficient of Variation:		0.44	0.23	0.23	0.20	0.27	0.00	0.29
Mann-Kendall Statistic (S):		76	4	38	29	-30	0	58
Confidence Factor:		>99.9%	55.3%	95.2%	89.5%	90.3%	48.2%	99.6%
Concentration Trend:		Increasing	No Trend	Increasing	No Trend	Prob. Decreasing	Stable	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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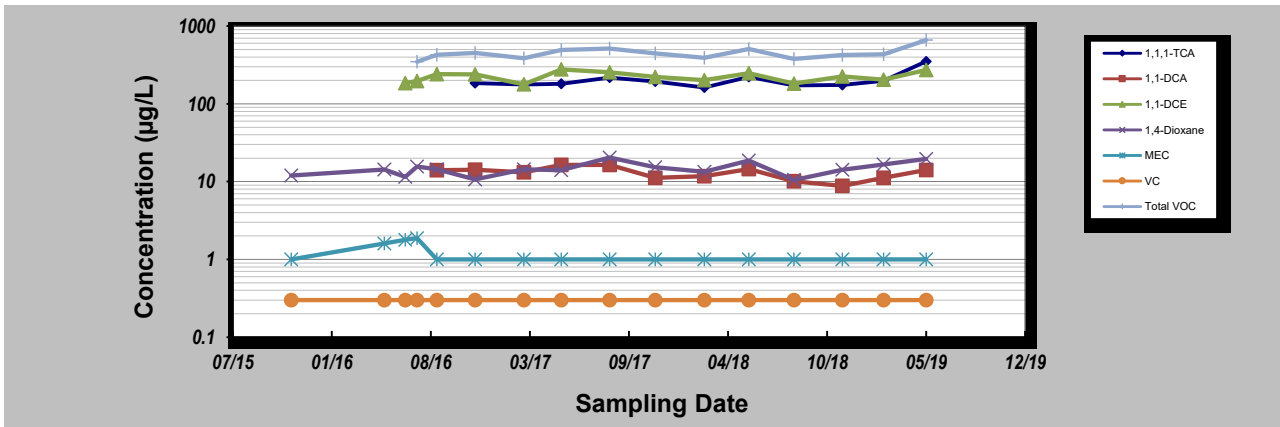
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW35 When Stable**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOC
Sampling Event	Sampling Date	MW35 WHEN STABLE CONCENTRATION (µg/L)						
1	10-Nov-15				12	1	0.3	
2	16-May-16				14.3	1.6	0.3	
3	27-Jun-16			185	11.5	1.79	0.3	
4	21-Jul-16			196	15.6	1.88	0.3	347.31
5	30-Aug-16		14	241	14.4	1	0.3	426.25
6	15-Nov-16	184	14.2	239	10.7	1	0.3	451.73
7	22-Feb-17	177	13.2	178	14.4	1	0.3	385.92
8	8-May-17	181	16.4	277	14	1	0.3	492.75
9	14-Aug-17	218	16.4	255	20.4	1	0.3	513.81
10	14-Nov-17	194	11.2	222	15.3	1	0.3	445.56
11	21-Feb-18	162	11.7	202	13.4	1	0.3	391.49
12	22-May-18	222	14.5	247	18.7	1	0.3	505.07
13	21-Aug-18	173	10.1	182	10.5	1	0.3	377.51
14	27-Nov-18	175	8.8	225	14.2	1	0.3	425
15	18-Feb-19	197	11.2	205	16.6	1	0.3	431.8
16	15-May-19	351	14.1	272	19.6	1	0.3	658.88
17								
18								
19								
20								
Coefficient of Variation:		0.26	0.18	0.15	0.20	0.27	0.00	0.18
Mann-Kendall Statistic (S):		11	-20	13	29	-30	0	18
Confidence Factor:		77.7%	90.2%	74.1%	89.5%	90.3%	48.2%	84.7%
Concentration Trend:		No Trend	Prob. Decreasing	No Trend	No Trend	Prob. Decreasing	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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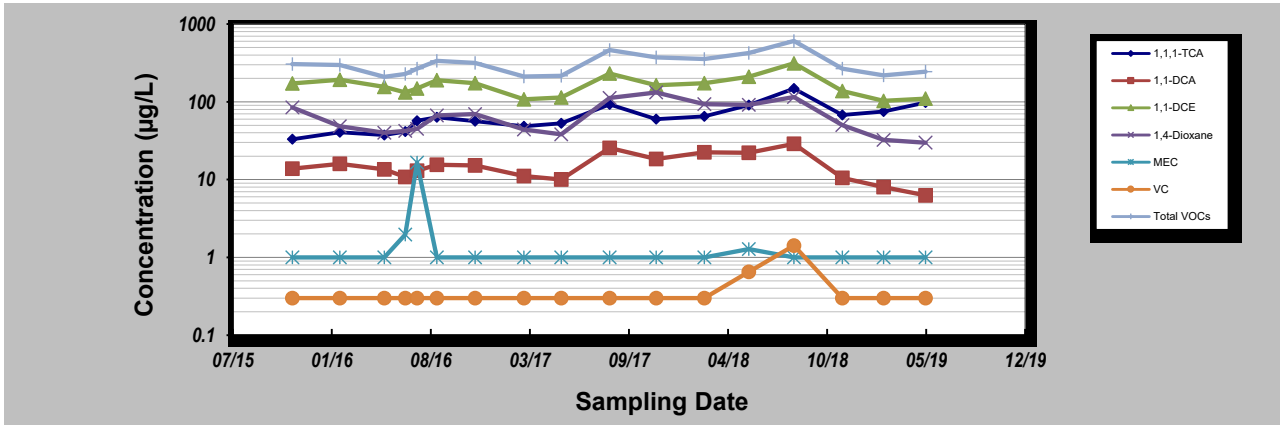
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW36**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW36 CONCENTRATION (µg/L)						
1	12-Nov-15	33	13.8	173	84.9	1	0.3	305.31
2	16-Feb-16	40.7	16	192	48.4	1	0.3	297.79
3	16-May-16	37.5	13.5	156	40	1	0.3	209.5
4	27-Jun-16	41.5	10.8	132	42.2	1.96	0.3	228.16
5	21-Jul-16	57.3	13	148	44.9	16.5	0.3	266.64
6	30-Aug-16	63.2	15.5	190	66.7	1	0.3	335.9
7	15-Nov-16	56.3	15.2	174	69.5	1	0.3	315.41
8	22-Feb-17	48.6	11.1	108	44.1	1	0.3	211.8
9	8-May-17	53.1	10	114	38.3	1	0.3	215.98
10	14-Aug-17	92.4	25.6	231	112	1	0.3	462.34
11	16-Nov-17	60.0	18.4	163	132	1	0.3	373.4
12	21-Feb-18	65.2	22.4	174	93.4	1	0.3	355
13	22-May-18	90.9	22.1	210	91.7	1.28	0.65	424.5
14	21-Aug-18	148	28.8	313	115	1	1.42	606.22
15	27-Nov-18	67.6	10.5	138	50.1	1	0.3	266.20
16	18-Feb-19	74.8	8.03	103	32.5	1	0.3	218.33
17	14-May-19	98.1	6.28	110	29.8	1	0.3	244.18
18								
19								
20								
Coefficient of Variation:		0.43	0.41	0.32	0.48	1.89	0.72	0.34
Mann-Kendall Statistic (S):		96	-10	-13	2	-11	19	22
Confidence Factor:		>99.9%	64.2%	68.7%	51.6%	65.7%	76.8%	80.4%
Concentration Trend:		Increasing	Stable	Stable	No Trend	No Trend	No Trend	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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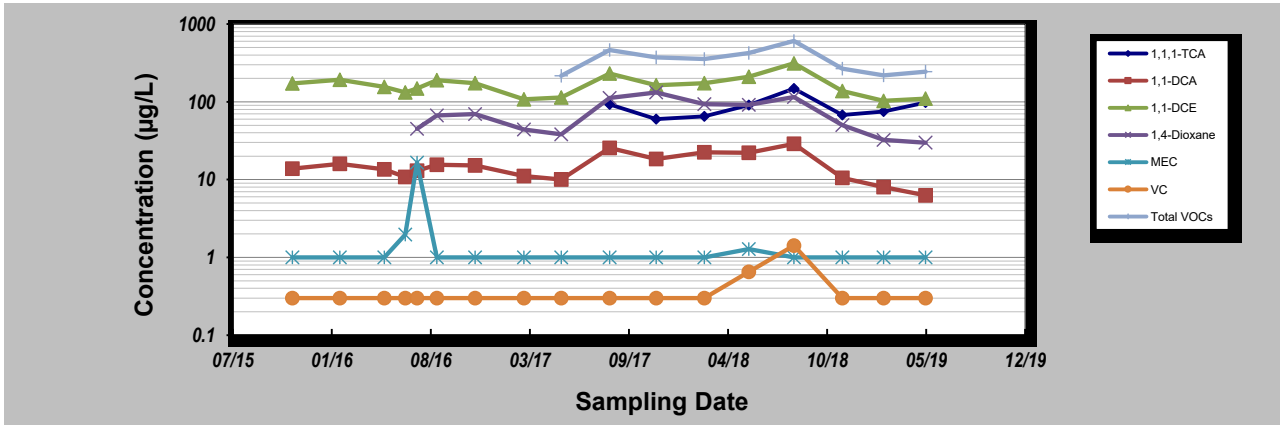
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW36 When Stable
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW36 WHEN STABLE CONCENTRATION (µg/L)						
1	12-Nov-15		13.8	173		1	0.3	
2	16-Feb-16		16	192		1	0.3	
3	16-May-16		13.5	156		1	0.3	
4	27-Jun-16		10.8	132		1.96	0.3	
5	21-Jul-16		13	148	44.9	16.5	0.3	
6	30-Aug-16		15.5	190	66.7	1	0.3	
7	15-Nov-16		15.2	174	69.5	1	0.3	
8	22-Feb-17		11.1	108	44.1	1	0.3	
9	8-May-17		10	114	38.3	1	0.3	215.98
10	14-Aug-17	92.4	25.6	231	112	1	0.3	462.34
11	16-Nov-17	60.0	18.4	163	132	1	0.3	373.4
12	21-Feb-18	65.2	22.4	174	93.4	1	0.3	355
13	22-May-18	90.9	22.1	210	91.7	1.28	0.65	424.5
14	21-Aug-18	148	28.8	313	115	1	1.42	606.22
15	27-Nov-18	67.6	10.5	138	50.1	1	0.3	266.2
16	18-Feb-19	74.8	8.03	103	32.5	1	0.3	218.33
17	14-May-19	98.1	6.28	110	29.8	1	0.3	244.18
18								
19								
20								
Coefficient of Variation:		0.33	0.41	0.32	0.49	1.89	0.72	0.37
Mann-Kendall Statistic (S):		8	-10	-13	-8	-11	19	-6
Confidence Factor:		80.1%	64.2%	68.7%	66.2%	65.7%	76.8%	69.4%
Concentration Trend:		No Trend	Stable	Stable	Stable	No Trend	No Trend	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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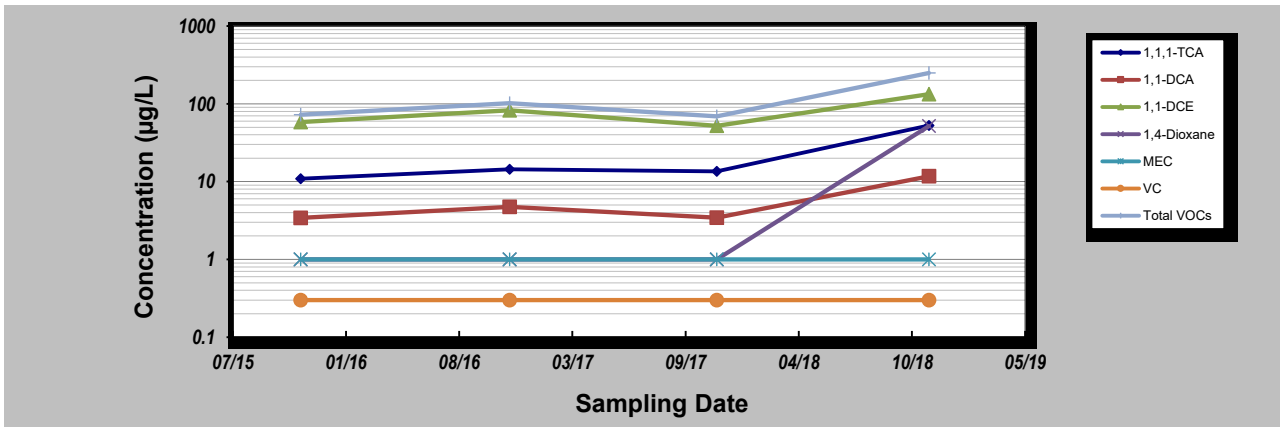
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW37**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW37 CONCENTRATION (µg/L)						
1	12-Nov-15	10.9	3.42	58.3	1	1	0.3	72.62
2	15-Nov-16	14.4	4.75	82.6	1	1	0.3	101.75
3	16-Nov-17	13.5	3.43	52.1	1	1	0.3	69.03
4	26-Nov-18	52.7	11.7	133	51.8	1	0.3	249.2
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.87	0.68	0.45	1.85	0.00	0.00	0.69
Mann-Kendall Statistic (S):		4	4	2	3	0	0	2
Confidence Factor:		83.3%	83.3%	62.5%	72.9%	37.5%	37.5%	62.5%
Concentration Trend:		No Trend	No Trend	No Trend	No Trend	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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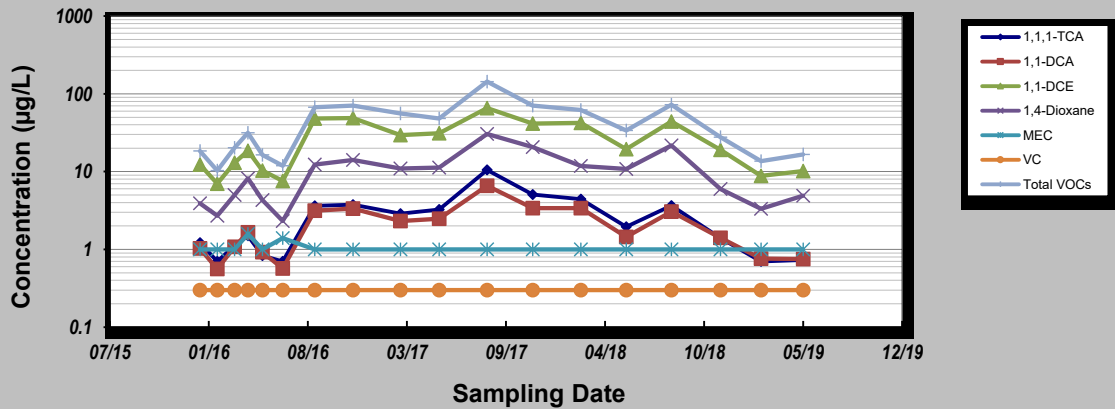
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW50**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW50 CONCENTRATION (µg/L)						
1	13-Jan-16	1.22	1.03	12.3	3.91	1	0.3	18.46
2	17-Feb-16	0.7	0.56	7.01	2.71	1	0.3	10.28
3	23-Mar-16	1.12	1.08	13	5	1	0.3	20.2
4	19-Apr-16	1.5	1.66	18.6	8.17	1.58	0.3	31.51
5	18-May-16	0.83	0.92	10.3	4.3	1	0.3	16.35
6	28-Jun-16	0.7	0.57	7.6	2.32	1.4	0.3	11.89
7	1-Sep-16	3.62	3.15	48.2	12.3	1	0.3	67.27
8	17-Nov-16	3.77	3.35	48.9	14.1	1	0.3	70.57
9	21-Feb-17	2.88	2.32	29.5	11	1	0.3	55.9
10	10-May-17	3.26	2.48	31.1	11.3	1	0.3	48.14
11	15-Aug-17	10.5	6.59	65.6	30.5	1	0.3	143.68
12	15-Nov-17	5.08	3.39	41.5	20.7	1	0.3	70.67
13	20-Feb-18	4.43	3.4	42.3	11.8	1	0.3	61.93
14	23-May-18	1.95	1.45	19.5	10.8	1	0.3	33.7
15	22-Aug-18	3.66	3.06	44.0	21.7	1	0.3	72.42
16	29-Nov-18	1.4	1.41	19	5.98	1	0.3	27.79
17	19-Feb-19	0.7	0.76	8.82	3.32	1	0.3	13.6
18	15-May-19	0.73	0.75	10.2	4.91	1	0.3	16.59
19								
20								
Coefficient of Variation:		0.91	0.73	0.67	0.75	0.15	0.00	0.77
Mann-Kendall Statistic (S):		20	21	23	31	-19	0	27
Confidence Factor:		76.2%	77.3%	79.5%	87.0%	75.0%	48.5%	83.5%
Concentration Trend:		No Trend	No Trend	No Trend	No Trend	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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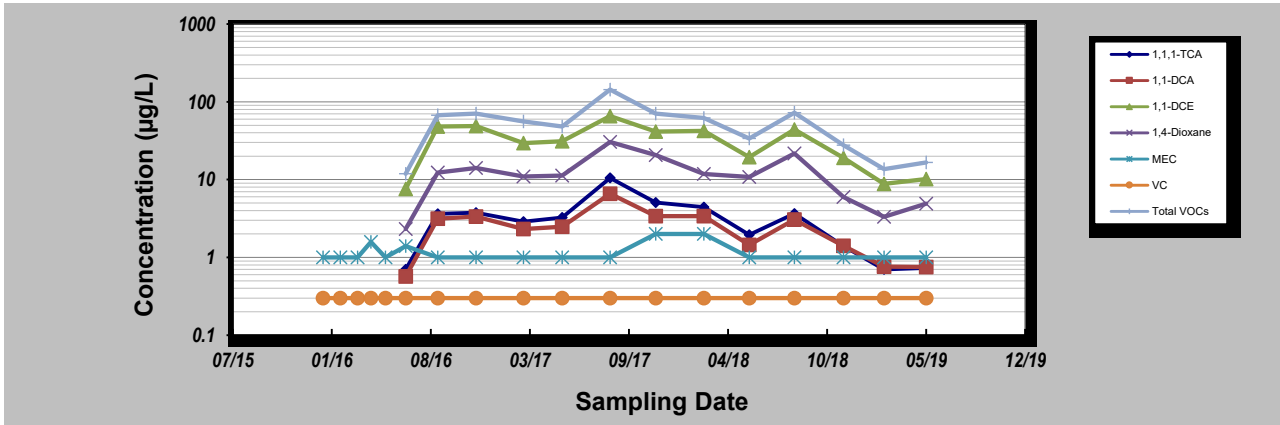
for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW50 When Stable
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:	1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
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Sampling Event	Sampling Date	MW50 WHEN STABLE CONCENTRATION (µg/L)						
1	13-Jan-16					1	0.3	
2	17-Feb-16					1	0.3	
3	23-Mar-16					1	0.3	
4	19-Apr-16					1.58	0.3	
5	18-May-16					1	0.3	
6	28-Jun-16	0.7	0.57	7.6	2.32	1.4	0.3	11.89
7	1-Sep-16	3.62	3.15	48.2	12.3	1	0.3	67.27
8	17-Nov-16	3.77	3.35	48.9	14.1	1	0.3	70.57
9	21-Feb-17	2.88	2.32	29.5	11	1	0.3	55.9
10	10-May-17	3.26	2.48	31.1	11.3	1	0.3	48.14
11	15-Aug-17	10.5	6.59	65.6	30.5	1	0.3	143.68
12	15-Nov-17	5.08	3.39	41.5	20.7	2	0.3	70.67
13	20-Feb-18	4.43	3.4	42.3	11.8	2	0.3	61.93
14	23-May-18	1.95	1.45	19.5	10.8	1	0.3	33.7
15	22-Aug-18	3.66	3.06	44.0	21.7	1	0.3	72.42
16	29-Nov-18	1.4	1.41	19	5.98	1	0.3	27.79
17	19-Feb-19	0.7	0.76	8.82	3.32	1	0.3	13.6
18	15-May-19	0.73	0.75	10.2	4.91	1	0.3	16.59
19								
20								

Coefficient of Variation:	0.80	0.65	0.57	0.65	0.29	0.00	0.66
Mann-Kendall Statistic (S):	-17	-18	-20	-14	-3	0	-16
Confidence Factor:	83.2%	84.7%	87.4%	78.2%	53.0%	48.5%	81.6%
Concentration Trend:	Stable	Stable	Stable	Stable	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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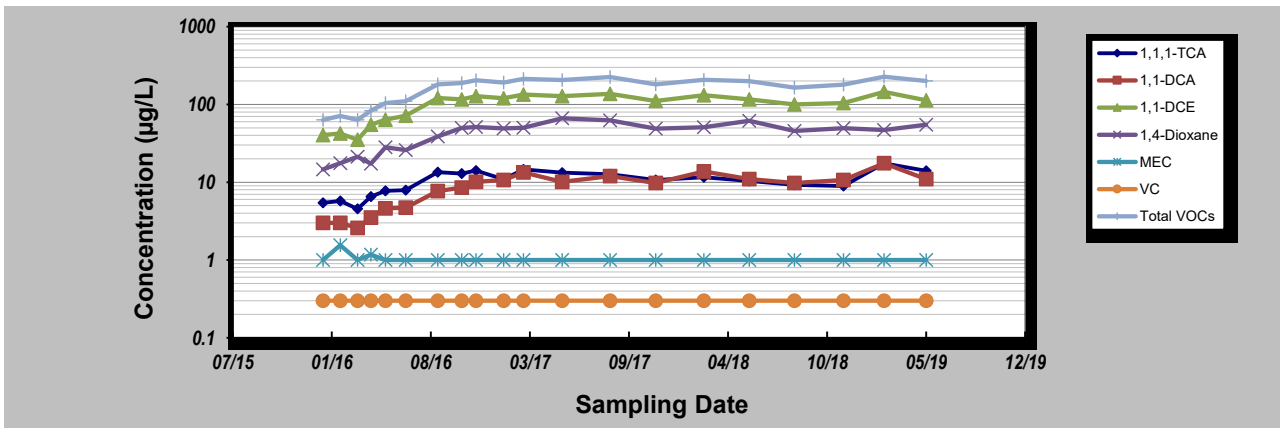
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW51**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW51 CONCENTRATION (µg/L)						
1	13-Jan-16	5.45	3.01	40.4	14.6	1	0.3	63.46
2	17-Feb-16	5.73	3.01	42.3	17.6	1.55	0.3	70.99
3	23-Mar-16	4.54	2.58	35.1	21.2	1	0.3	63.42
4	19-Apr-16	6.53	3.52	54.8	17.3	1.17	0.3	83.32
5	18-May-16	7.73	4.6	63.7	28.2	1	0.3	104.23
6	28-Jun-16	7.9	4.7	71.4	25.9	1	0.3	109.9
7	1-Sep-16	13.5	7.7	121	38.7	1	0.3	180.9
8	19-Oct-16	12.9	8.55	116	50	1	0.3	187.86
9	17-Nov-16	14.1	10.1	128	51.4	1	0.3	204.16
10	12-Jan-17	10.9	10.7	120	49.1	1	0.3	190.7
11	21-Feb-17	14.6	13.4	134	50.1	1	0.3	212.52
12	10-May-17	13.3	10.1	128	66.3	1	0.3	205.4
13	15-Aug-17	12.7	12	137	62.4	1	0.3	224.52
14	15-Nov-17	10.7	9.8	111	48.8	1	0.3	180.3
15	20-Feb-18	11.6	13.7	131	50.8	1	0.3	207.1
16	23-May-18	10.4	11	116	61.4	1	0.3	198.8
17	22-Aug-18	9.25	9.8	99.8	45.7	1	0.3	164.55
18	29-Nov-18	8.93	10.7	104	49.5	1	0.3	180.22
19	19-Feb-19	17.5	17.5	145	47	1	0.3	227
20	15-May-19	14	11	113	55	1	0.3	200.43
21								
22								
23								
24								
25								
Coefficient of Variation:		0.33	0.46	0.35	0.38	0.12	0.00	0.35
Mann-Kendall Statistic (S):		70	129	84	96	-31	0	102
Confidence Factor:		98.8%	>99.9%	99.7%	99.9%	83.3%	48.7%	>99.9%
Concentration Trend:		Increasing	Increasing	Increasing	Increasing	Stable	Stable	Increasing



Notes:

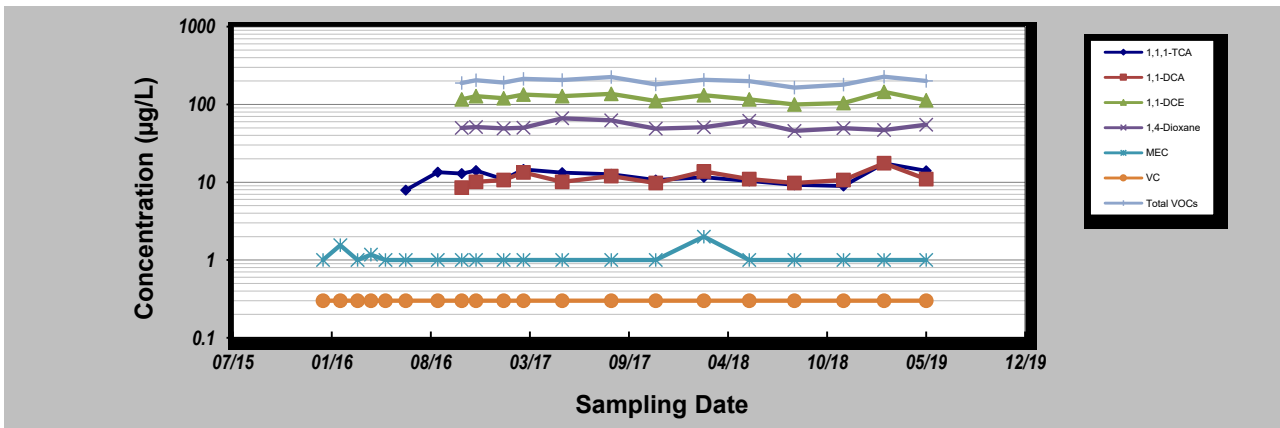
- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $>95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW51 When Stable
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Event	Sampling Date	1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
MW51 WHEN STABLE CONCENTRATION (µg/L)								
1	13-Jan-16					1	0.3	
2	17-Feb-16					1.55	0.3	
3	23-Mar-16					1	0.3	
4	19-Apr-16					1.17	0.3	
5	18-May-16					1	0.3	
6	28-Jun-16	7.9				1	0.3	
7	1-Sep-16	13.5				1	0.3	
8	19-Oct-16	12.9	8.55	116	50	1	0.3	187.86
9	17-Nov-16	14.1	10.1	128	51.4	1	0.3	204.16
10	12-Jan-17	10.9	10.7	120	49.1	1	0.3	190.7
11	21-Feb-17	14.6	13.4	134	50.1	1	0.3	212.52
12	10-May-17	13.3	10.1	128	66.3	1	0.3	205.4
13	17-Aug-17	12.7	12	137	62.4	1	0.3	224.52
14	15-Nov-17	10.7	9.8	111	48.8	1	0.3	180.3
15	20-Feb-18	11.6	13.7	131	50.8	2	0.3	207.1
16	23-May-18	10.4	11	116	61.4	1	0.3	198.8
17	22-Aug-18	9.25	9.8	99.8	45.7	1	0.3	164.55
18	29-Nov-18	8.93	10.7	104	49.5	1	0.3	180.22
19	19-Feb-19	17.5	17.5	145	47	1	0.3	227
20	15-May-19	14	11	113	55	1	0.3	200.43
21								
22								
23								
24								
25								
Coefficient of Variation:		0.21	0.20	0.11	0.12	0.23	0.00	0.09
Mann-Kendall Statistic (S):		-11	22	-10	-10	-20	0	0
Confidence Factor:		68.7%	89.8%	70.5%	70.5%	72.9%	48.7%	47.6%
Concentration Trend:		Stable	No Trend	Stable	Stable	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

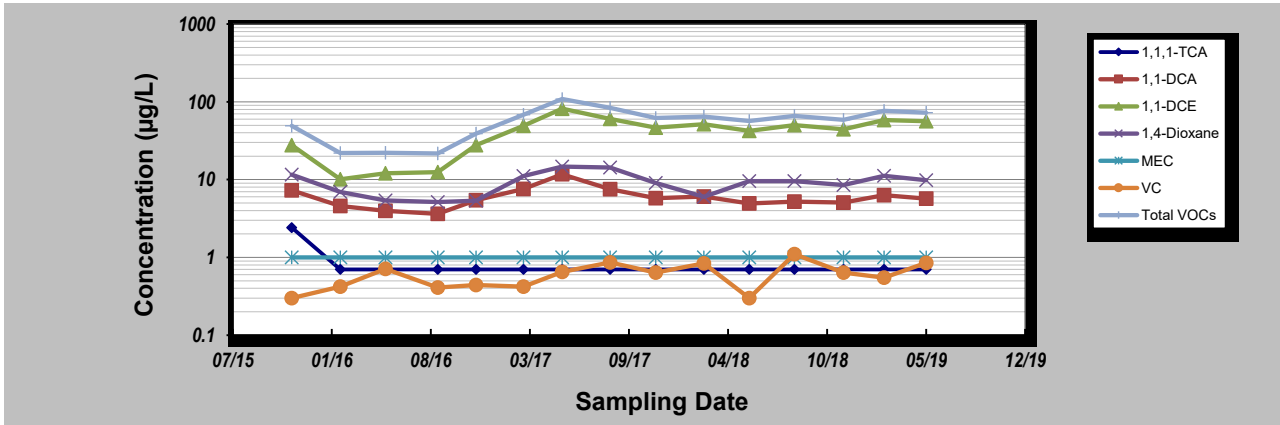
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW52**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW52 CONCENTRATION (µg/L)						
1	11-Nov-15	2.42	7.3	27.8	11.6	1	0.3	49.12
2	17-Feb-16	0.7	4.58	10.1	6.93	1	0.42	22.03
3	18-May-16	0.7	3.97	12.1	5.41	1	0.71	22.19
4	1-Sep-16	0.7	3.63	12.5	5.15	1	0.41	21.69
5	17-Nov-16	0.7	5.43	27.7	5.35	1	0.44	38.92
6	21-Feb-17	0.7	7.59	49.2	11.1	1	0.42	68.31
7	10-May-17	0.7	11.7	81.7	14.7	1	0.65	108.75
8	15-Aug-17	0.7	7.54	60.2	14.3	1	0.86	83.53
9	15-Nov-17	0.7	5.79	46.4	9.07	1	0.64	61.9
10	20-Feb-18	0.7	6.04	51.5	6.03	1	0.84	64.41
11	23-May-18	0.7	4.94	42.3	9.55	1	0.3	56.79
12	22-Aug-18	0.7	5.22	50.1	9.56	1	1.1	65.98
13	29-Nov-18	0.7	5.06	44.3	8.54	1	0.64	58.54
14	19-Feb-19	0.7	6.29	58.4	11.2	1	0.55	76.44
15	15-May-19	0.7	5.69	56.2	9.8	1	0.85	72.54
16								
17								
18								
19								
20								
Coefficient of Variation:		0.55	0.32	0.48	0.33	0.00	0.38	0.42
Mann-Kendall Statistic (S):		-14	5	47	17	0	36	41
Confidence Factor:		73.7%	57.7%	99.0%	78.2%	48.0%	95.9%	97.7%
Concentration Trend:		Stable	No Trend	Increasing	No Trend	Stable	Increasing	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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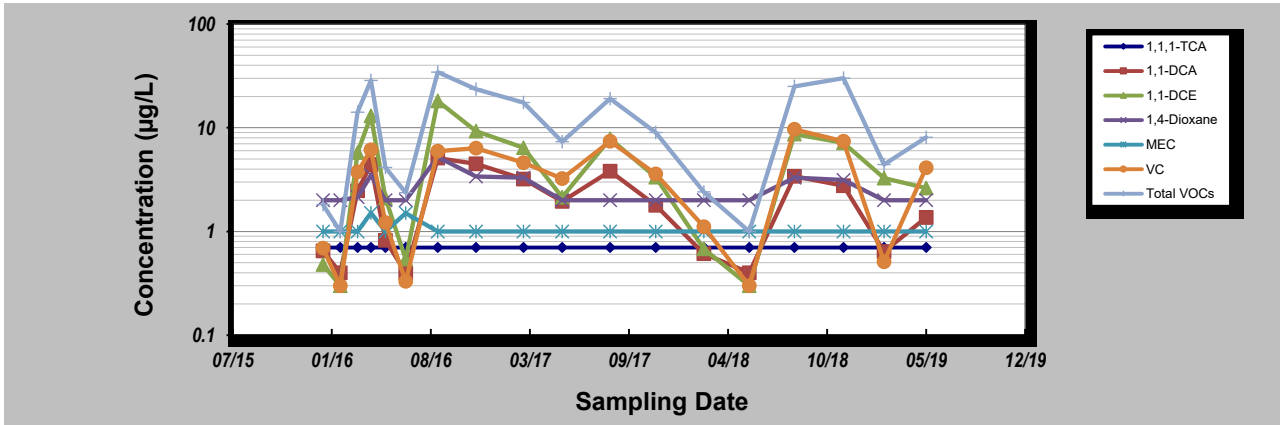
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW53
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW53 CONCENTRATION (µg/L)						
1	13-Jan-16	0.7	0.65	0.48	2	1	0.69	1.82
2	17-Feb-16	0.7	0.4	0.3	2	1	0.3	1
3	23-Mar-16	0.7	2.47	5.76	2.14	1	3.76	14.13
4	19-Apr-16	0.7	4.43	13	3.49	1.51	6.14	28.57
5	18-May-16	0.7	0.82	2.1	2	1	1.22	4.14
6	28-Jun-16	0.7	0.4	0.54	2	1.5	0.33	2.37
7	1-Sep-16	0.7	5.1	18.1	5.23	1	5.96	34.39
8	17-Nov-16	0.7	4.48	9.28	3.38	1	6.37	23.51
9	21-Feb-17	0.7	3.2	6.42	3.31	1	4.6	17.53
10	10-May-17	0.7	1.95	2.14	2	1	3.24	7.33
11	15-Aug-17	0.7	3.81	7.85	2	1	7.42	19.08
12	15-Nov-17	0.7	1.79	3.34	2	1	3.59	9.02
13	20-Feb-18	0.7	0.61	0.68	2	1	1.11	2.4
14	23-May-18	0.7	0.4	0.3	2	1	0.3	1
15	22-Aug-18	0.7	3.4	8.69	3.3	1	9.65	25.04
16	29-Nov-18	0.7	2.76	7.15	3.14	1	7.42	30.13
17	19-Feb-19	0.7	0.64	3.27	2	1	0.51	4.42
18	15-May-19	0.7	1.36	2.62	2	1	4.12	8.1
19								
20								
Coefficient of Variation:		0.00	0.75	0.97	0.35	0.15	0.80	0.87
Mann-Kendall Statistic (S):		0	-8	6	-16	-19	23	16
Confidence Factor:		48.5%	60.3%	57.4%	71.3%	75.0%	79.5%	71.3%
Concentration Trend:		Stable	Stable	No Trend	Stable	Stable	No Trend	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

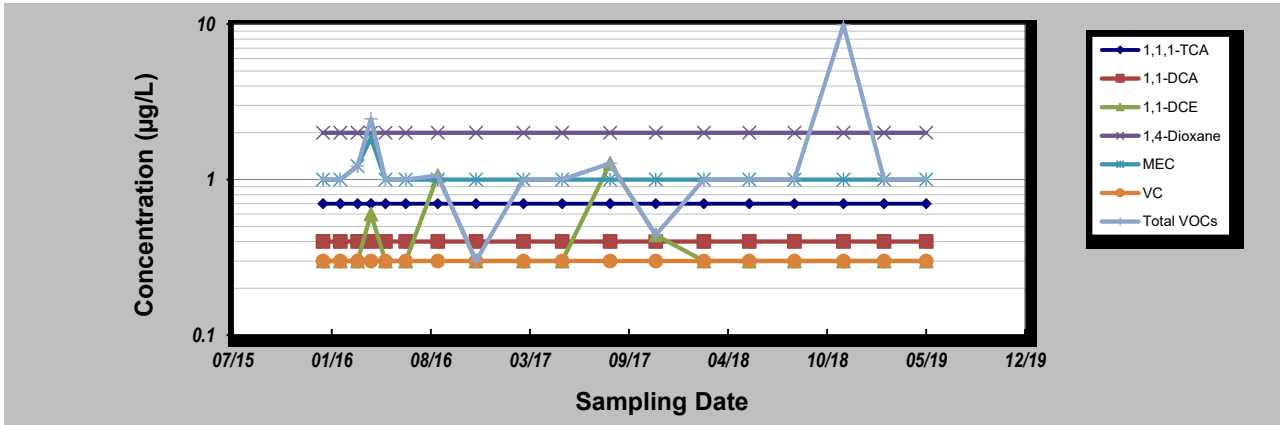
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GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW54
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW54 CONCENTRATION (µg/L)						
1	13-Jan-16	0.7	0.4	0.3	2	1	0.3	1
2	17-Feb-16	0.7	0.4	0.3	2	1	0.3	1
3	23-Mar-16	0.7	0.4	0.3	2	1.22	0.3	1.22
4	19-Apr-16	0.7	0.4	0.6	2	1.86	0.3	2.46
5	18-May-16	0.7	0.4	0.3	2	1	0.3	1
6	28-Jun-16	0.7	0.4	0.3	2	1	0.3	1
7	1-Sep-16	0.7	0.4	1.06	2	1	0.3	1.06
8	17-Nov-16	0.7	0.4	0.3	2	1	0.3	0.3
9	21-Feb-17	0.7	0.4	0.3	2	1	0.3	1
10	10-May-17	0.7	0.4	0.3	2	1	0.3	1
11	15-Aug-17	0.7	0.4	1.27	2	1	0.3	1.27
12	15-Nov-17	0.7	0.4	0.44	2	1	0.3	0.44
13	20-Feb-18	0.7	0.4	0.3	2	1	0.3	1
14	23-May-18	0.7	0.4	0.3	2	1	0.3	1
15	22-Aug-18	0.7	0.4	0.3	2	1	0.3	1
16	29-Nov-18	0.7	0.4	0.3	2	1	0.3	9.87
17	19-Feb-19	0.7	0.4	0.3	2	1	0.3	1
18	15-May-19	0.7	0.4	0.3	2	1	0.3	1
19								
20								
Coefficient of Variation:		0.00	0.00	0.67	0.00	0.19	0.00	1.38
Mann-Kendall Statistic (S):		0	0	-8	0	-23	0	-6
Confidence Factor:		48.5%	48.5%	60.3%	48.5%	79.5%	48.5%	57.4%
Concentration Trend:		Stable	Stable	Stable	Stable	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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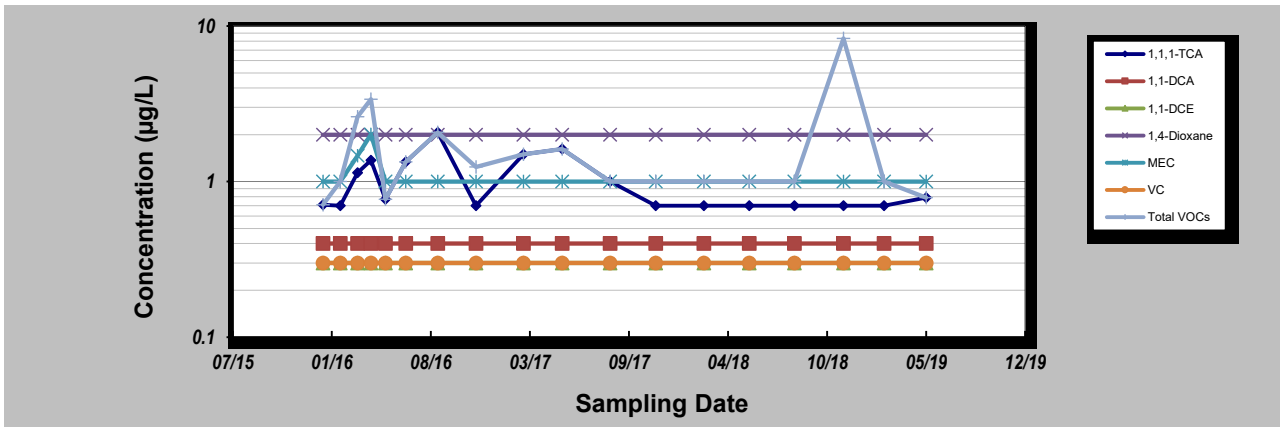
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW55
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW55 CONCENTRATION (µg/L)						
1	13-Jan-16	0.71	0.4	0.3	2	1	0.3	0.71
2	17-Feb-16	0.7	0.4	0.3	2	1	0.3	1
3	23-Mar-16	1.14	0.4	0.3	2	1.47	0.3	2.61
4	19-Apr-16	1.37	0.4	0.3	2	2.01	0.3	3.38
5	18-May-16	0.77	0.4	0.3	2	1	0.3	0.77
6	28-Jun-16	1.34	0.4	0.3	2	1	0.3	1.34
7	1-Sep-16	2.07	0.4	0.3	2	1	0.3	2.07
8	17-Nov-16	0.7	0.4	0.3	2	1	0.3	1.24
9	21-Feb-17	1.5	0.4	0.3	2	1	0.3	1.5
10	10-May-17	1.62	0.4	0.3	2	1	0.3	1.62
11	15-Aug-17	1	0.4	0.3	2	1	0.3	1
12	15-Nov-17	0.7	0.4	0.3	2	1	0.3	1
13	20-Feb-18	0.7	0.4	0.3	2	1	0.3	1
14	23-May-18	0.7	0.4	0.3	2	1	0.3	1
15	22-Aug-18	0.7	0.4	0.3	2	1	0.3	1
16	29-Nov-18	0.7	0.4	0.3	2	1	0.3	8.32
17	19-Feb-19	0.7	0.4	0.3	2	1	0.3	1
18	15-May-19	0.79	0.4	0.3	2	1	0.3	0.79
19								
20								
Coefficient of Variation:		0.42	0.00	0.00	0.00	0.24	0.00	1.02
Mann-Kendall Statistic (S):		-33	0	0	0	-23	0	-18
Confidence Factor:		88.5%	48.5%	48.5%	48.5%	79.5%	48.5%	73.8%
Concentration Trend:		Stable	Stable	Stable	Stable	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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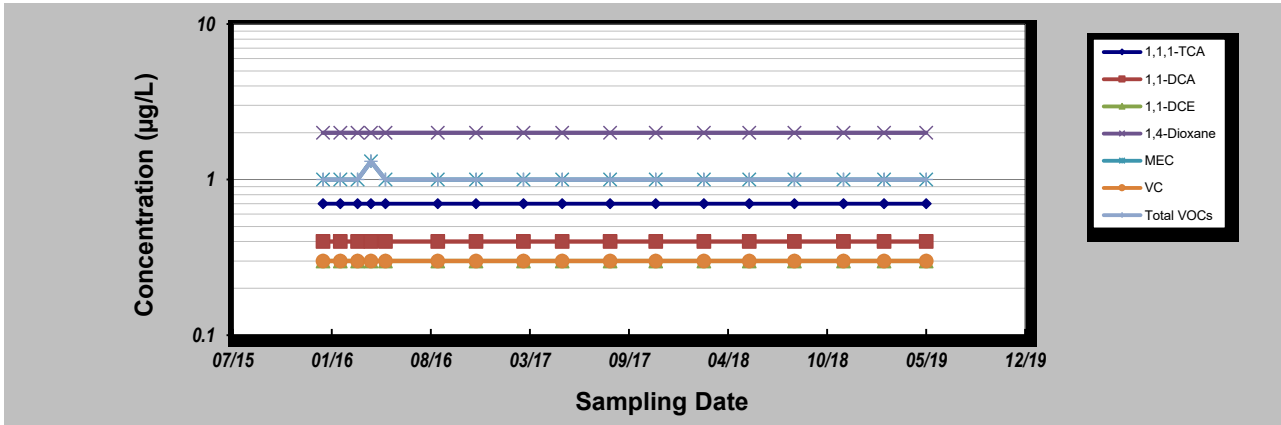
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW56 (June 2016 sample broken)**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW56 (JUNE 2016 SAMPLE BROKEN) CONCENTRATION (µg/L)						
1	13-Jan-16	0.7	0.4	0.3	2	1	0.3	1
2	17-Feb-16	0.7	0.4	0.3	2	1	0.3	1
3	23-Mar-16	0.7	0.4	0.3	2	1	0.3	1
4	19-Apr-16	0.7	0.4	0.3	2	1.31	0.3	1.31
5	18-May-16	0.7	0.4	0.3	2	1	0.3	1
6	1-Sep-16	0.7	0.4	0.3	2	1	0.3	1
7	17-Nov-16	0.7	0.4	0.3	2	1	0.3	1
8	21-Feb-17	0.7	0.4	0.3	2	1	0.3	1
9	10-May-17	0.7	0.4	0.3	2	1	0.3	1
10	15-Aug-17	0.7	0.4	0.3	2	1	0.3	1
11	15-Nov-17	0.7	0.4	0.3	2	1	0.3	1
12	20-Feb-18	0.7	0.4	0.3	2	1	0.3	1
13	23-May-18	0.7	0.4	0.3	2	1	0.3	1
14	22-Aug-18	0.7	0.4	0.3	2	1	0.3	1
15	29-Nov-18	0.7	0.4	0.3	2	1	0.3	1
16	19-Feb-19	0.7	0.4	0.3	2	1	0.3	1
17	15-May-19	0.7	0.4	0.3	2	1	0.3	1
18								
19								
20								
Coefficient of Variation:		0.00	0.00	0.00	0.00	0.07	0.00	0.07
Mann-Kendall Statistic (S):		0	0	0	0	-10	0	-10
Confidence Factor:		48.4%	48.4%	48.4%	48.4%	64.2%	48.4%	64.2%
Concentration Trend:		Stable	Stable	Stable	Stable	Stable	Stable	Stable



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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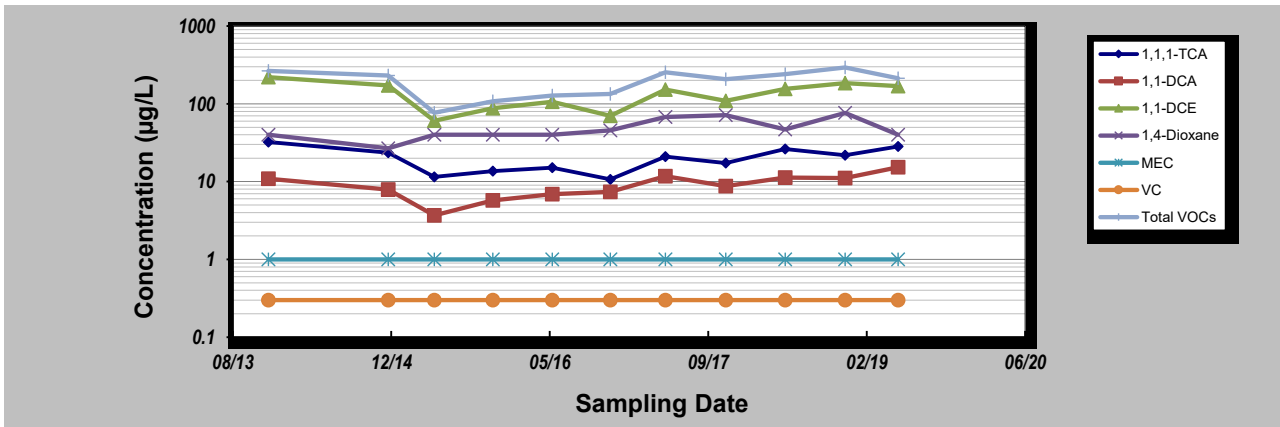
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **May 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **MW63**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW63 CONCENTRATION (µg/L)						
1	4-Dec-13	32.3	10.9	220	40	1	0.3	264.89
2	17-Dec-14	23.5	7.91	172	26.8	1	0.3	231.42
3	12-May-15	11.5	3.68	60.6	40	1	0.3	76.78
4	12-Nov-15	13.6	5.75	87.9	40	1	0.3	107.69
5	18-May-16	15.1	6.89	106	40	1	0.3	127.99
6	17-Nov-16	10.7	7.37	69.9	45.6	1	0.3	133.57
7	10-May-17	21	11.7	153	67.9	1	0.3	254.06
8	16-Nov-17	17.3	8.78	109	71.5	1	0.3	206.58
9	23-May-18	26.3	11.3	156	46.9	1	0.3	240.5
10	28-Nov-18	21.8	11.1	184	76.4	1	0.3	293.3
11	14-May-19	28.3	15.3	169	40	1	0.3	212.6
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.35	0.36	0.38	0.33	0.00	0.00	0.37
Mann-Kendall Statistic (S):		11	27	11	29	0	0	15
Confidence Factor:		77.7%	98.0%	77.7%	98.7%	45.1%	45.1%	85.9%
Concentration Trend:		No Trend	Increasing	No Trend	Increasing	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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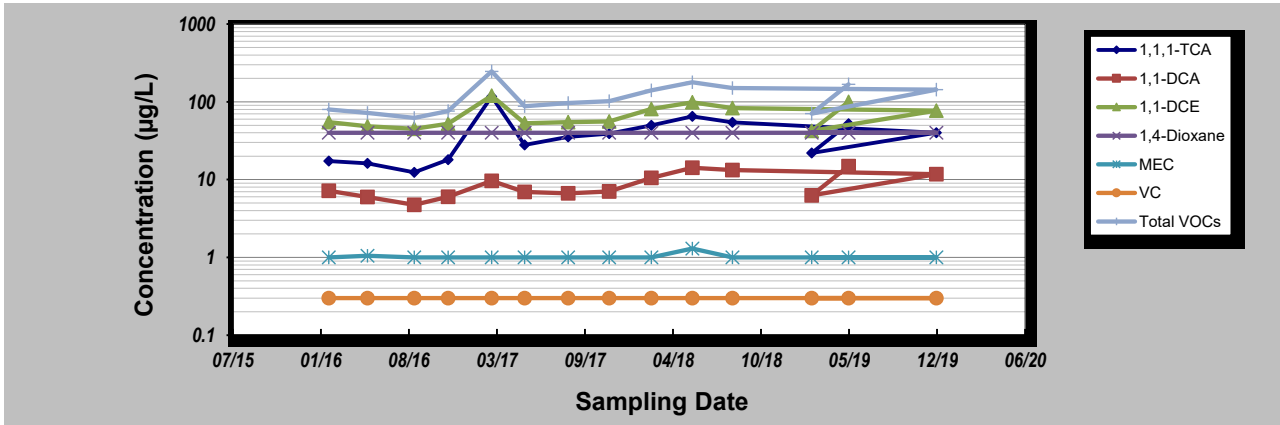
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: June 2019	Job ID: 6480199002
Facility Name: Former Richmond Works Facility	Constituent: MW66
Conducted By: Sheri Knox	Concentration Units: µg/L

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	MW66 CONCENTRATION (µg/L)						
1	18-Feb-16	17.3	7.19	54.9	40	1	0.3	79.89
2	16-May-16	16.2	5.98	48.6	40	1.05	0.3	71.8
3	30-Aug-16	12.4	4.74	45	40	1	0.3	62.14
4	15-Nov-16	18	6	52.2	40	1	0.3	76.2
5	22-Feb-17	117	9.63	120	40	1	0.3	246.63
6	8-May-17	28	6.95	52.9	40	1	0.3	87.85
7	15-Aug-17	35.4	6.65	54.7	40	1	0.3	96.75
8	16-Nov-17	39	7.04	56.1	40	1	0.3	102.14
9	20-Feb-18	49.7	10.5	80.7	40	1	0.3	140.9
10	24-May-18	64.8	14.2	98.7	40	1.3	0.3	179
11	23-Aug-18	54.3	13.3	83.3	40	1	0.3	150.9
12	29-Nov-18	40.1	11.7	77.3	40	1	0.3	143.2
13	19-Feb-19	22	6.26	42.4	40	1	0.3	70.66
14	14-May-19	52.4	14.9	100	40	1	0.3	167.3
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.68	0.38	0.35	0.00	0.08	0.00	0.45
Mann-Kendall Statistic (S):		41	45	31	0	-5	0	37
Confidence Factor:		98.7%	99.3%	95.0%	47.8%	58.5%	47.8%	97.6%
Concentration Trend:		Increasing	Increasing	Prob. Increasing	Stable	Stable	Stable	Increasing



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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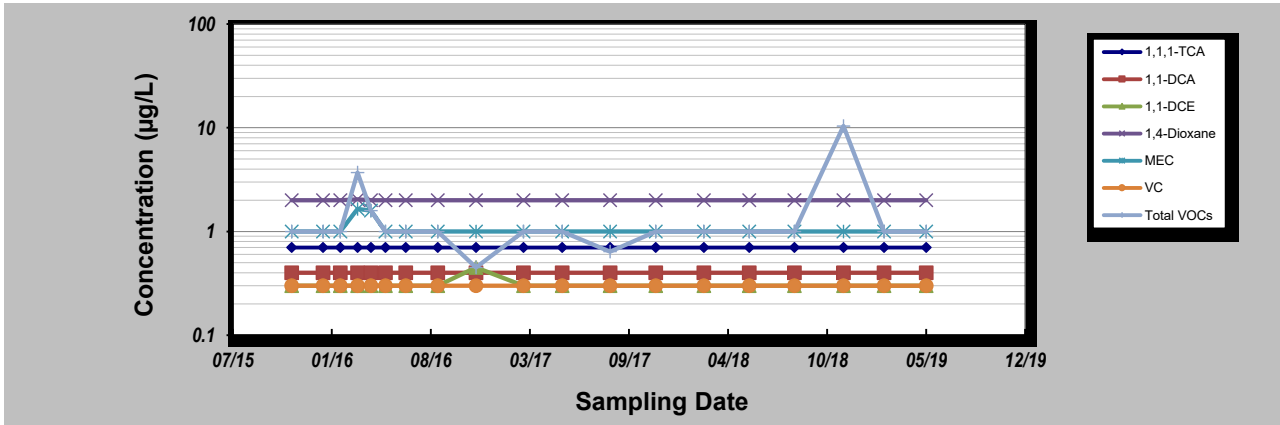
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GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: **June 2019** Job ID: **6480199002**
 Facility Name: **Former Richmond Works Facility** Constituent: **SW67**
 Conducted By: **Sheri Knox** Concentration Units: **µg/L**

Sampling Point ID:		1,1,1-TCA	1,1-DCA	1,1-DCE	1,4-Dioxane	MEC	VC	Total VOCs
Sampling Event	Sampling Date	SW67 CONCENTRATION (µg/L)						
1	11-Nov-15	0.7	0.4	0.3	2	1	0.3	1
2	13-Jan-16	0.7	0.4	0.3	2	1	0.3	1
3	17-Feb-16	0.7	0.4	0.3	2	1	0.3	1
4	23-Mar-16	0.7	0.4	0.3	2.04	1.65	0.3	3.69
5	19-Apr-16	0.7	0.4	0.3	2	1.59	0.3	1.59
6	18-May-16	0.7	0.4	0.3	2	1	0.3	1
7	28-Jun-16	0.7	0.4	0.3	2	1	0.3	1
8	1-Sep-16	0.7	0.4	0.3	2	1	0.3	1
9	17-Nov-16	0.7	0.4	0.45	2	1	0.3	0.45
10	21-Feb-17	0.7	0.4	0.3	2	1	0.3	1
11	10-May-17	0.7	0.4	0.3	2	1	0.3	1
12	15-Aug-17	0.7	0.4	0.3	2	1	0.3	0.64
13	15-Nov-17	0.7	0.4	0.3	2	1	0.3	1
14	20-Feb-18	0.7	0.4	0.3	2	1	0.3	1
15	23-May-18	0.7	0.4	0.3	2	1	0.3	1
16	22-Aug-18	0.7	0.4	0.3	2	1	0.3	1
17	29-Nov-18	0.7	0.4	0.3	2	1	0.3	10.4
18	19-Feb-19	0.7	0.4	0.3	2	1	0.3	1
19	15-May-19	0.7	0.4	0.3	2	1	0.3	1
20								
Coefficient of Variation:		0.00	0.00	0.11	0.00	0.18	0.00	1.37
Mann-Kendall Statistic (S):		0	0	-2	-12	-23	0	-6
Confidence Factor:		48.6%	48.6%	51.4%	64.8%	77.7%	48.6%	56.9%
Concentration Trend:		Stable	Stable	Stable	Stable	Stable	Stable	No Trend



Notes:

- At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing ($S > 0$) or decreasing ($S < 0$): $> 95\%$ = Increasing or Decreasing; $\geq 90\%$ = Probably Increasing or Probably Decreasing; $< 90\%$ and $S > 0$ = No Trend; $< 90\%$, $S \leq 0$, and $COV \geq 1$ = No Trend; $< 90\%$ and $COV < 1$ = Stable.
- Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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